PUBLIC HEALTH POLICY AND MORTALITY IN LATIN AMERICA: THE CASE OF ECUADOR

By

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To my family, whose silent support
is always in my mind, and to the
memory of my brother and father.

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Public health policy in Ecuador has evolved from the traditional concepts of Christian charity and public beneficence for indigent people afflicted by disease to its present recognition as a basic human right. The government is now obliged by law to provide medical and health care services to the entire population.

After many years of much rhetoric but practical neglect, there has been a dramatic increase in the programming and implementation of public health policy in the country, particularly since the early 1960's. However, public health has not been one of the main priorities of the government. The percentage of the central government's budget allocated to public health agencies remains relatively low.

The preventive and curative health services available are concentrated in urban areas, particularly in Quito and Guayaquil, the two largest cities; very few services are provided for the rural population, which represents nearly two-thirds of the nation's total. A substantial proportion of the presently available health resources serve only a limited

clientele, representing primarily middle and upper class groups, e.g. the medical care services of the Ecuadorian Social Security Institute, which are virtually restricted to its mostly urban based, white collar and skilled blue collar affiliates (about six percent of the total population of the country).

The research shows that, although mortality as a whole has declined, deaths of children under five years of age still account for about half of all deaths. For the total population, the main causes of death are infectious and parasitic diseases and diseases of the respiratory system.

The statistical analysis of the data indicates that most of the variations in mortality are attributable to unexplained factors. From 1962 to 1974, variations in mortality rates among Ecuador's provinces were only slightly correlated with either public health policy implementation or socioeconomic development. These findings are probably affected by the nature of the data and the use of aggregate indices. Further analysis indicates that lower mortality in 1962 and 1974 is mainly associated with increased literacy, greater provision of sewage services, and more doctors per population. Contrary to expectations, the mortality decline occurring in the 1962 to 1974 period is negatively associated with decreasing agrarianism (i.e., the proportion of the labor force engaged in agriculture and related activities) and with the provision of hospital beds, but, on the other hand, as expected, mortality decline is also positively related with the provision of sewage service and with increasing number of doctors per population.

Therefore, the prevalent theory that mortality decline in post-1930 Latin America is determined mainly by the utilization of modern medical and health care techniques is only partly supported by the data on Ecuador. Mortality decline is related to the provision of public health services more than to socioeconomic development but, in general, it is still mostly unexplained.

CHAPTER I
INTRODUCTION

The Importance of Public Health Policy to Morbidity and Mortality

The reduction of the morbidity and mortality of the population is a concern of most modern governments. In contrast to the case of fertility control which has encountered strong opposition in some countries, there has been almost no opposition to governmental projects designed to control mortality and to improve health conditions.

Direct government action plays a large role in the reduction of mortality. As Johnson (1965) points out, the accomplishments of nations in the area of mortality control are related to the execution of development plans as well as to plans for better provision of health services. The provision of medical and health services is of particular importance since their main function is precisely the reduction of morbidity and mortality. Public health-related decisions determine to a large degree the population's level of exposure to disease as well as its differential access to available health services.

Following Berelson (1971), public health policy -- which can also be interpreted as mortality policy -- is defined as governmental actions that are designed to alter the population's mortality or that actually do alter it. Therefore, this study takes into account not only explicit health related pronouncements of the government but also what is implicit in other areas such as budget allocations, trends of expenditures and programs (executed or in operation) and their achievements. Health policy outcomes or implementation are thus reflected in the qualitative and quantitative distribution of medical and sanitation services around the country.

The Substantive Context

There is a substantial body of literature dealing with the determinants of mortality decline in both the economically advanced nations of the world and in the economically less advanced ones (Arriaga and Davis, 1969; Helleiner, 1957; Kusukawa, 1965; McKeown and Brown, 1965; McKeown and Record, 1962; Matras, 1975; Stolnitz, 1955; Vallin, 1968).

While the literature on public policy relevant to population matters is becoming abundant (e.g. Berelson, 1971; Ohlin, 1974; Sauvy, 1969; Vickers, 1974), it tends to focus primarily on the United States and much less on other areas of the world. In terms of demographic aspects considered, the available literature leans heavily in favor of public policies on either fertility control (Berelson, 1973b; Brackett, 1962; Burch, 1974) or its urban growth correlates (Antonini, 1972; Miller and Gakenheimer, 1971). Mortality relevant policies have not received much attention from demographers or public policy analysts. This occurs despite the fact that population policies to reduce mortality have been found to be more effective than policies to affect, for instance, fertility (Berelson, 1971:174).

There are, however, some authors who deal with the subject of public policy and health. Kitagawa (1972), for instance, has written about differential mortality in the United States and tried, if unsuccessfully, to analyze its implications for public policy. A less explicit work but still relevant to the subject is that of Noonan et al.(1972), in which the authors indicate, first, that the United States' food distribution programs, originally conceived to assist farmers, have evolved into programs strengthening the health of children and the poor, and second, that all laws promoting health, save those directed to the care of persons past reproductive age, lead to increased population growth, not only because they decrease mortality but also because they benefit reproduction.

Important theoretical contributions have also been made by Ugalde (1972a, 1972b, 1973) and Navarro (1974). Ugalde's work is concerned mainly with the politico-sociological aspects of public health policy rather than with its demographic dimensions. Among the author's main contributions are the concept and model "series of decisions." Series of decisions is defined as the total number of decisions made in the attainment of a goal. According to the series of decisions model, there are four basic types of decisions: 1) input decisions, which mark the beginning of series, 2) programming decisions, which are made in the process of preparing a program, 3) formal decisions, which accept a program, and 4) implementation decisions, which are made in the process of implementing a formal decision. In addition, the author provides an inventory of factors influencing decisions which can be of great value for a detailed study of the decision making process in a nation (see Ugalde, 1973).

Navarro places the matters of both public health policy and distribution of health resources in a wider structural context and states that "the distribution of human health resources follows and parallels the distribution of most of the resources in underdeveloped countries" (1974: 6). The author further argues that the maldistribution of health resources in Latin America is determined by the same factors that cause underdevelopment in the continent, namely its economic and cultural dependency and the fact that certain social classes control the mechanisms of control and distribution of resources in general, including health resources. Thus, he says: "parallel to what occurs in the overall economy, the same social groups that determine the patterns of production and consumption in the primary and secondary sectors also shape patterns of production and consumption in the health sector. And it can be posited that these are patterns that do not benefit the majority of the population" (Navarro, 1974:14).

Using the Republic of Colombia as a case in point, Navarro continues: "If we look at the type of morbidity prevalent in the surveyed population (i.e. infectious diseases and malnutrition) and the comparative effectiveness of the different health activities for combating this morbidity, it would seem that environmental health services and preventive personal health services should be given far higher priority than curative services, and particularly the hospital services" (1974:17).

The literature dealing with population and health policy in Ecuador is scarce. While mortality and, to a lesser extent, the health system in Ecuador have been studied previously (Ecuador, Junta Nacional de Planificación y Coordinación /JNPC/, Centro de Analisis Demográfico /CAD/, 1974; Ministerio de Salud Pública /MSP/, División Nacional de Planificación /DNP/, 1974, 1975, 1976; Favin, 1973; Linden, 1967), the role of public policy in relation to demographic variables has been practically neglected. Sanders (1972) points out several cases which illustrate a conscious governmental policy designed to introduce fertility reduction programs in the country. Vega (1964), on the other hand, indicates some mortality relevant policies when he states that the provision of public services -- including, of course, health services -- is one of the basic functions of the state. Recent Ecuadorian government publications have also expressed the intent to improve health and sanitation conditions of the population and to further reduce general mortality, particularly infant mortality which is rather high (JNPC, 1972a, 1972b). Public policies affecting demographic variables, among them mortality also have been discussed by this author (Uquillas 1973).

An Analytical Framework

Existing knowledge indicates that mortality reduction in Latin America is related to the provision of sanitation and medical services (see, for instance, Arriaga and Davis, 1969). In Ecuador, the mortality rate decline from an estimated 28.9 per thousand in 1920 to 12.4 in 1965 has been attributed to the improvement of health and sanitation services through the post-1930 campaigns against cholera, malaria, yellow fever, smallpox, and other diseases (Sanders, 1972).

After providing the necessary background information on public health policy making and on mortality change in Ecuador, with particular emphasis on the 1960-75 period, this study attempts to find whether there is a relationship between (a) mortality and socioeconomic development and (b) mortality and what is referred to here as public health policy implementation or, simply, public health. The data analysis involves two time-related approaches: 1) a synchronic or cross-sectional approach and 2) a diachronic or longitudinal approach. Using data for two fixed points in time, circa 1962 and circa 1974, the synchronic approach tests the main hypothesis that, in Ecuador's provinces, the greater the public health policy implementation in a given year (1962 or 1974), the less the mortality of the population in the same year. In contrast, using data on the change occurring between circa 1962 and circa 1974, the diachronic analysis tests the main hypothesis that, in Ecuador's provinces, the greater the public health policy implementation during the 12-year period, the greater the mortality decline of the population during the same period. One basic assumption under which this analysis operates is that, although the actual data on socioeconomic development and public health policy implementation may be concurrent to those of mortality, they represent phenomena prior in time to mortality. This assumption is necessary because the most reliable and readily available data are either those collected by the national census or those which can be used in conjunction with the census reports.

Methodology

Data Collection

The basic sources of data for this work are: 1) the national censuses of 1950, 1962, and 1974; 2) the vital statistics reports published by the Ecuadorian Civil Register (Anuarios de Estadísticas Vitales); 3) additional demographic data and health statistics published by the National Statistical Institute (Anuarios de Estadística) as well as by international organizations, such as the United Nations (Demographic Yearbook, Population and Vital Statistics Report), the InterAmerican Statistical Institute (América en Cifras), the Pan American Health Organization, etc; 4) official documents and publications (among them those of the Official Register, the Ministry of Health and the National Planning Board); and 5) data obtained from open-ended interviews with selected decision makers and others with knowledge in the area of public health.

Ecuador's census data have been reported as being fairly reliable (Saunders, 1959; Merlo, 1969); however, data on vital events, specifically on deaths, seem to be incomplete mainly due to underregistration. Therefore, the author has made a special effort to select those figures of greater dependability and, when necessary, to identify the shortcomings of the data.

The data collection phase consisted primarily of the acquisition and borrowing for consultation of census materials and vital statistics as well as several other forms of official records and documents (which were summarized in the previous section). To a lesser extent, data for the study of public health policy were collected in open-ended interviews with officials of the Ecuadorian government. These interviews tried to elicit information on public policy and its implementation, information which often is not available in written form.

The collection of most of the data was carried out from June to November, 1975. A great deal of time was invested in locating officials who were knowledgeable about particular aspects of health and requesting authorization to review official documents. In some cases, the uniqueness of a given document or the lack of cooperation of an official required the researcher to examine and take notes on the document while in one particular office. Sometimes officials allowed the researcher to take out documents for xeroxing; and occasionally, some government employees were kind enough to provide extra copies of them.

Interviewing was a particularly hard task. While there were some officials who were glad to give part of their time to answer questions and talk about their work, a significant number of them were hard to find because their work included frequent travel to provinces. A few high officials were reluctant to be interviewed personally and designated a subordinate to do the talking. Frequently, this was beneficial since career employees, in positions of lesser political significance, had longer acquaintance and better knowledge of the activities of a given office.

The officials interviewed were either chiefs of Division (a subclassification of the Ministry of Health), who ranked next to the Minister and his undersecretary, or their delegated subordinates. The Divisions they represented were: Planning, Technical Services, Finances, Development of Health, Epidemiology, Nutrition, and Odontology.

Some public officials working in other government agencies were also interviewed, particularly employees of the National Planning Board (Social Affairs Section) and the Medical Department of the Ecuadorian Social Security Institute.

As the questionnaire was open-ended, the interviews varied in format and length. In general, officials were asked questions about basic health policies of the Ministry section in which they worked and were encouraged to elaborate on their objectives, mode of operation, specific plans or programs, their financing, methods of implementation, and duration in time. The need for information on officially adopted programs and their financing was particularly stressed.

The officials' reaction to being interviewed varied greatly. Some were disposed to elaborate at length on the subject matter while others were very incommunicative.*

Public officials do not always think in terms of "public policy," "norms," "guidelines," or "implementation." A circuitous manner of approaching the subject was required in many cases. Therefore, when a given official was uncertain about the health policies of his subdivision, he was requested to answer questions such as: what does your office do? what are its functions within the Ministry of Health? and what work does it do at the local or national levels?

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* An extreme example of the latter is given by a Chief of Division who basically said "policy is money" and when queried about the meaning of his statement, he replied that no matter what is stated as policy, its implementation is possible only when money is allocated.

Data Analysis

For the data analysis phase, the author used such procedures as assembling, summarization, and interpretation of the censuses and other demographic and statistical data. In the study of mortality there was an extensive reliance on several basic techniques which are widely used in the field of demography, among them the crude death rate and the infant mortality rate (see Elízaga, 1969; Barclay, 1970; Smith and Zopf, 1970, UN, 1967). The study of factors related to mortality decline was performed partly using a social typology constructed according to Mattelart and Garretón's (1965) method and partly using statistical measures appropriate for interval scale variables, primarily simple and partial correlations.

Outline of the Study

Following this introductory chapter, some background information about Ecuador in general and about its public health history in particular is provided in chapter II. Some characteristics about the country and its people are briefly outlined in order to provide a specific frame of reference and to present some of the terms used in the rest of the study. Also, an abbreviated history of public health and of the development of public health policy is presented beginning with the nineteenth century. Some specific dates and events are taken as representative of a period in public health history and as stepping stones leading to an understanding of present public health policies. For each period considered, an effort is made to describe prevalent ideas about health, some problems and solutions, including actions taken by the government.

Chapter III deals with public health policy since 1960 to the present. It is primarily concerned with the series of decisions defined as programming, i.e., the elaboration of health plans and programs as well as the creation of institutions of public health.

Chapter IV covers implementation decisions as reflected in their outcomes. The analysis of public health policy implementation includes data which range from national budget allocations for public health to the final regional and provincial distribution of public health services in the nation. The differential distribution of services, until about 1960 and from 1960 to 1974, is particularly studied in order to find what sectors of the population are better served than others.

Chapter V looks into the mortality conditions of the country. Regional and provincial differences are analyzed according to various factors such as age, sex, and residence. This chapter includes a section on the main causes of death in relatively recent time periods.

In chapter VI the case of Ecuador is used to test two main hyptheses of mortality change: 1) that which posits that mortality change is related to socioeconomic development and 2) that which affirms that mortality change is primarily associated with the development of modern techniques of health care. There is also a brief discussion of the relationship between mortality and particular aspects within public health policy implementation.

Finally, chapter VII presents some concluding comments, particularly in regards to the model tested in chapter VI and alternative ways of using the data available in order to obtain a better explanation of mortality.

It should be pointed out that chapters II to IV, which represent a large portion of this study, deal mainly with background information. This relatively large treatment of institutional developments, plans and programs, and the distribution of health services does not make very interesting reading. Yet, it is of great importance not only for area specialists but also for people concerned with the study and improvement of health conditions in Ecuador. This is probably the first comprehensive effort of this type, and is the result of much effort, particularly that of connecting disjointed pieces of data.

CHAPTER II
THE DEVELOPMENT OF PUBLIC HEALTH POLICY IN ECUADOR

The Country: Selected Characteristics

Geographical Setting

The Republic of Ecuador at the present time occupies an area of approximately 271,000 square kilometers. Its territory is located on the northeastern part of South America, bordering Colombia on the north, Peru on the south and east, and the Pacific Ocean on the west. The Andes mountain range crosses the country from north to south creating a continental area of three contrasting regions: 1) the Sierra (literally the Highlands) or the territory occupied by the Andes; 2) the Costa (literally the Coast) or western lowlands, and 3) the Oriente (literally the Orient) or eastern lowlands. The Galápagos Islands, located over five hundred miles off the coast, have been traditionally considered a fourth natural region. The Oriente has about half the country's total surface, the Sierra and the Costa share the other half.

Demographic Contrasts

Ecuador is a country of sharp contrasts. One of them concerns the way in which the population is distributed. From the data presented in Table 1 and Figure 1, it can be observed that, in 1974, 97 percent of the population lived in the highland and coastal regions, where densities ranged from 13.5 inhabitants per square kilometer in Esmeraldas to 74.6 in Guayas. On the other hand, less than three percent of the population lived in the eastern region and the Galápagos Islands; their densities

Table 1. Population of Ecuador, Number and Percent, by Region and Province, 1962 and 1974.

Region Province	Population (Thousands)			
	1962		1974	
	Number	Percent	Number	Percent
NATION	4,476	100.0	6,512	100.0
Sierra	2,171	50.7	3,137	48.2
Azuay	275	6.1	367	5.6
Bolívar	132	2.9	145	2.2
Cañar	113	2.5	146	2.2
Carchi	95	2.1	121	1.9
Cotopaxi	155	3.5	226	3.4
Chimborazo	277	6.2	304	4.7
Imbabura	174	3.9	216	3.3
Loja	285	6.4	342	5.3
Pichincha	588	13.1	988	15.2
Tungurahua	179	4.0	278	4.8
Costa	2,127	47.6	3,179	48.8
El Oro	161	3.6	262	4.0
Esmeraldas	125	2.8	203	3.1
Guayas	979	21.9	1,512	23.2
Los Rios	250	5.6	383	5.9
Manabí	613	13.7	818	12.5
Oriente	75	1.7	174	2.6
Morona S.	26	.6	54	.8
Napo	24	.5	62	.9
Pastaza	14	.3	23	.4
Zamora Ch.	11	.3	34	.5
Galápagos	2	.0	4	.1
Zones under dispute			18	.3

Source: DEC, 1964; Ecuador, Oficina de los Censos Nacionales (OCN), n.d.

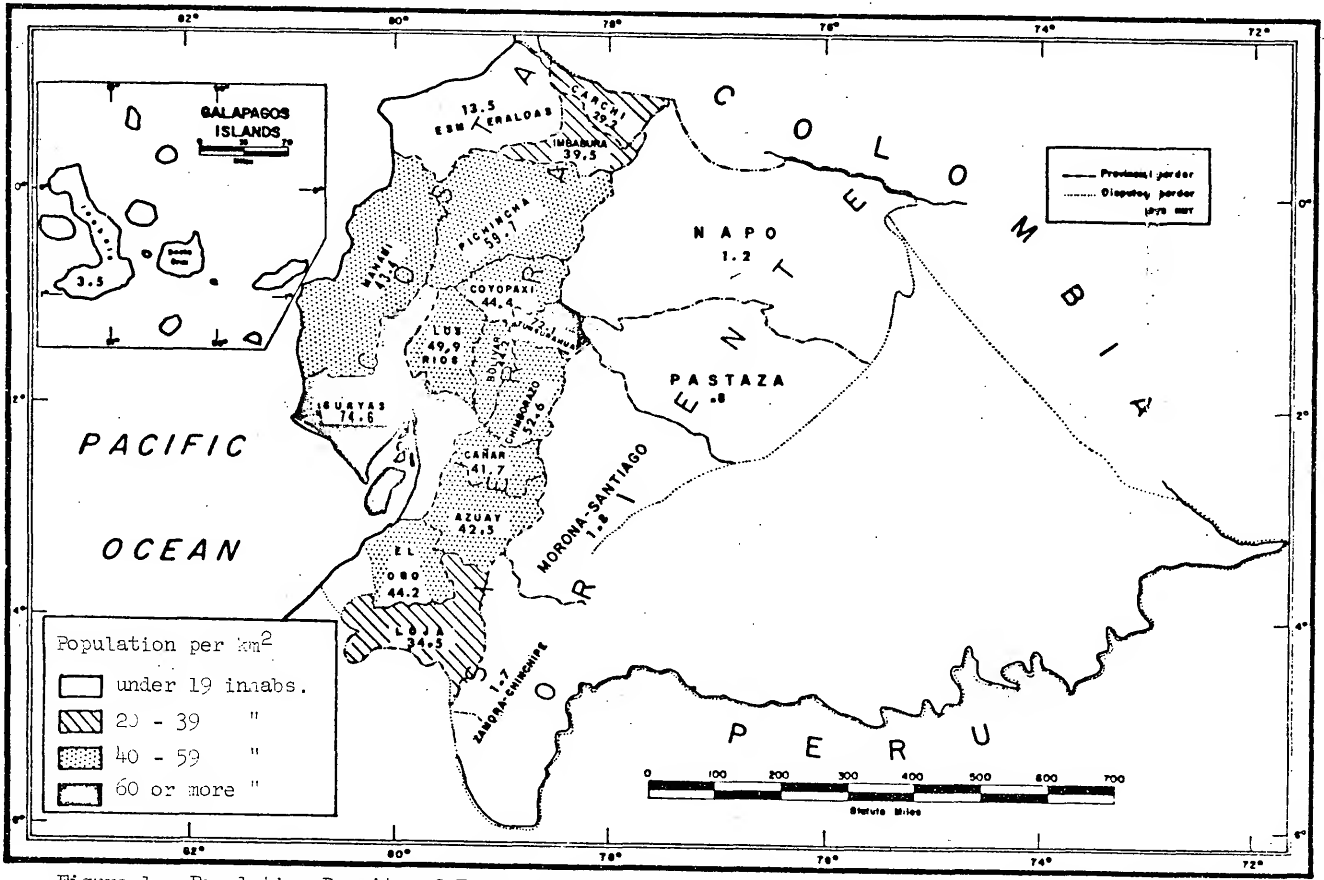

Figure 1. Population Density of Ecuador, by Province, 1974
Source: Elaborated by the author from data in OCN, n.d ; JNPC, 1976.

were below two inhabitants per square kilometer.

Administration and Politics

A unitary State, Ecuador currently divides its territory, for politico-administrative purposes, into 20 provinces. Each province is ruled by an appointed governor, who represents the executive branch of government. Provinces in turn are subdivided into cantons. There are 114 cantons in the country; each of them is ruled by an alcalde (mayor), who, by law, is supposed to be elected to the post but when a de facto government is in power, is often appointed. Cantons are subdivided into parishes, which are the smallest politico-administrative units. There are 917 parishes, 203 urban and 714 rural; each of them is ruled by a political lieutenant, who is also appointed by the executive branch.

One of the main characteristics of the political system of Ecuador is the instability of national governments. The country's history records a long succession of constitutions, elections, coups d'état, and short-lived regimes. Since 1830 to the present, there have been 16 different constitutions, an average of one per each nine year period. Only three times -- from 1948 to 1960 -- have elected presidents finished their terms in office. All other elected governments have been cut short by coups d'état. In fact coups d'état are the usual means of reaching power in the nation.

Regardless of the way in which they acquired power, Ecuadorian presidential regimes have been short-lived. This has been mostly due to the conflicting interests of the country's oligarquía (oligarchy) or ruling elite. The political instability, typical of Ecuador as well as of other Latin American nations, is vividly illustrated by the events of the last decade. In 1966, a Military Junta was deposed after three years of de facto rule. It was soon followed by the interim government of President

Yerovi Indaburu and the election of a Constitutional Assembly. This Assembly selected a new president, Otto Arosemena Gómez, wrote a new constitution, and called for national elections. In 1968, José Maria Velasco Ibarra was elected president; he declared himself dictator in 1970, doing away with the latest constitution, the congress, and many other elected officials. Within two years, in February 1972, Velasco was overthrown by the Military. The new dictatorship was at first led by General Guillermo Rodriguez Lara and, since ealy 1976, has been headed by a three-man Junta.

Also, Ecuador's political system has traditionally been characterized by decentralization of decision-making. Thus, the power of formulating public policy often has been relegated to autonomous institutions. To a large extent, decentralization has been due to the existence of regionalism in the country's politics and to the lack of adequate means of communication among the different regions and provinces. The Sierra and the Costa often have followed different political courses, as illustrated by the turn of the century split between the predominantly Conservative highlands region and the predominantly Liberal coastal region. In regard to the lack of communication, before the 1920's, the only effective means of transport between the Sierra and the Costa was the Quito-Guayaquil railroad and, at the present time, although the situation has improved with the opening of several roads across the nation, there are still large areas isolated from the rest of the country, i.e., the Oriente provinces.

In addition to decentralization and instability, some of the factors affecting policy-making in Latin America -- mentioned by Anderson (1967: 115-137) -- are also applicable to the Ecuadorian case, particularly the following: 1) the government's limited knowledge of the country's needs, due to lack of capable personnel and lack of accurate statistical information; 2) the low degree of the citizenry's concern and participation in the political process (usually less than 15 percent of Ecuador's total population participates in the electoral process); and 3) the role of special interest groups in the making of public policy. (For further details on Ecuadorian politics, see Martz, 1972.)

Social and Economic Aspects

By most social and economic indicators, Ecuador belongs to the so-called underdeveloped or Third World nations. Traditionally, it has been one of the poorest nations of Latin America, with no major industries, and dependent to a large degree on income derived from export of agricultural products such as bananas, cocoa, and coffee. In the last four years, thanks to the discovery and subsequent exploitation of oil in the Oriente, Ecuador has been able to increase its national revenue and has invested some of it in national social and economic development programs. Its gross domestic product grew from US $841 million in 1960, to US $1676 in 1970 and US $3475 in 1974; while it took ten years to double the 1960 figure, it took only four years to double the 1970 figure. Its mean annual per capita income has gone from US $195 in 1960 to US $275 in 1970 and US $500 in 1974. The budget expenditures of the Central Government have also increased from US $69 million in 1960 to US $148 in 1970 and US $447 in 1974 (Ecuador, Banco Central, 1975).

The apparent improvement in socioeconomic conditions, however, does not mean that social conditions have improved at the same time. The increased benefits the state receives are only partially transmitted to the masses of people. The degree and speed to which this distribution occurs depends heavily on whether social welfare is among the priorities of the national government. At this point in time it is not possible to evaluate properly the effects that recent events such as the exploitation of oil and the military rule since 1972 will have on the social configuration of the country.

Recent evidence indicates that the population of Ecuador is still predominantly rural; in 1974, over 58 percent of all inhabitants lived in rural areas. The national census (OCN, 1975) defines as urban the population of provincial capitals and canton seats (when the latter are in concentrated nuclei). The percentage of economically active population (aged 12 and over) engaged in agricultural and related activities is very high, although it has decreased from about 64 percent in 1962 to 56 percent in 1974. Moreover, at a time when many modern states of the world have practically eliminated illiteracy, over a quarter of the population (26 percent in 1974) is still unable to read and write a simple paragraph. Finally, according to sample results of the 1974 national census (OCN, 1975), over 61 percent of the total number of existing dwellings lacked the minimal services of potable water, electricity, toilet, and sewerage connection. The majority of dwellings consisted of no more than two rooms and gave shelter to an average of five persons per dwelling.

A Brief History of Public Health

The history of public health and of medicine in a nation cannot be segregated from other historical facts and the sequence of events to which they belong. As a specialized history of Ecuador is beyond the limits of the present endeavor, the author has opted for the presentation of a brief sketch of health and health policies taking 1895 and 1960 as major turning points. The year 1895 marks the advent of Liberal governments and a new conception of the State in relation to Public Health. The year 1960 marks the beginning of a period of increased awareness of the need for change, the adoption of planning at the national level, and the creation of important public health institutions.

The Pre-National Period

Before 1534, the year in which the Spaniards consolidated their control of the northern part of the Inca Empire by taking over Quito and "founding" it with the name of "Villa Real de San Francisco de Quito," the territory of the present Republic of Ecuador was occupied by innumerable Indian tribes, some of which formed loose confederations in the *hoyas* or intermountain valleys of the Andes. Of these confederations, the "Quitu" or "Shiry" was the most influential in the period preceding the conquest. This confederation, also known as the "Kingdom of Quito," was integrated into the Inca Empire when the Spanish military arrived in America. According to Phelan (1967:44) the most accurate estimates of the pre-conquest population of the Kingdom of Quito are those which have placed the figure not beyond the 780,000 to 1,000,000 mark.

The Spanish conquest radically altered the demographic structure of the Inca Empire. It provoked a great reduction in the number of inhabitants due to the wars of conquest and the introduction of diseases which, in the form of sweeping epidemics, decimated the Indian population (who had not developed any immunity to these new types of virus strains). During the colonial period, thousands of Indians were killed by successive epidemics of smallpox and measles, as well as other diseases. In 1589, 30,000 people died in the city of Quito as a consequence of unidentified epidemics (CAD, 1975:6); about a century later, in 1680, smallpox alone caused the deaths of more than 60,000 people in the territory of the old Kingdom of Quito (Dobyns, 1963).

Regarding the number of inhabitants of the Kingdom of Quito during the sixteenth and seventeenth centuries, there are estimates of about half a million before 1600 (Phelan, 1967:49) and 580 thousand in 1650 (Debuyst, 1961:160).

The illnesses which the Spaniards communicated to the indigenous inhabitants constituted true bacteriological weapons which facilitated the conquest and subsequent long-lasting domination of the latter people. To state that the Indians had no defenses against those diseases does not mean that they did not have some knowledge of medicine and public health care. In fact, long before the Spaniards came, the native Americans had already a vast knowledge of the medical properties of many plants and herbs and had even performed more complex healing procedures, such as the brain surgery the Incas apparently used to extirpate tumors. Moreover, they had knowledge of preventive hygienic measures, which perhaps were incorporated in their religion and lore (see Paredes, 1963).

This folk medicine and traditional knowledge, accumulated by trial and error for many centuries, came to represent the main medical resource of the people of Ecuador. Even today, it is difficult to say what is the impact of folk medicine and its contribution to public health. However, its impotence in the face of epidemics, a commonplace occurrence in Ecuador until as recently as the 1930's, is beyond doubt. The present historical sketch does not deal with folk medicine and its contribution to public health. It is not because it may be considered unimportant. Rather, it is suspected to be crucial in the general welfare of the population, and particularly, in that of the less privileged segments of Ecuadorian people. Its neglect is due to the fact that this dissertation is focused on public health policy, i.e., governmental actions designed to alter the population's health conditions.

The First Decades of National Life: 1830 to 1895

The population of Ecuador at the time of its separation from the Gran Colombia in 1830 -- eight years after gaining independence from Spain -- is estimated at around 800 thousand inhabitants. During that period in history the population must have increased very slowly because by 1861 a census of the Sierra and Costa counted approximately 839 thousand inhabitants. About 94 percent of the people enumerated lived in the Sierra. Quito had about 35 thousand people and Guayaquil over 15 thousand (Paredes, 1963, Vol. II).

According to the limited information available (Paredes, 1963; Madero, 1955; CAD, 1975), the population of Quito grew from about 30 thousand in the 1830's to 45 thousand in the 1890's. The population of Guayaquil grew from about 10 thousand in the 1830's to somewhere between 30 and 45 thousand in the 1890's.

During the nineteenth century, several diseases periodically assumed epidemic proportions and caused great loss of life. Among these were yellow fever, smallpox, malaria, dysentery, measles, tuberculosis, syphilis, leprosy, tetanus, and whooping cough. An 1840 yellow fever epidemic, for example, caused the death of 4,550 people in areas which are now the Provinces of Guayas and El Oro (Madero, 1955:206).

Preventive services

The few preventive services available in the early years of the Republic were provided by the Juntas de Sanidad (sanitary boards), some of which predated Independence, while others were created by Simón Bolívar when he was president of Gran Colombia. Quito and Guayaquil (perhaps also Cuenca, Loja, and Riobamba) had sanitary boards during most of the nineteenth century.

By the 1860's, the main function of the Juntas de Sanidad was to obtain and preserve the smallpox vaccine, and sometimes also the yellow fever vaccine -- both of which were already available in Europe and North America -- for use in the frequent epidemic outbreaks. The customary response to an outbreak of smallpox was mass immunization of the population.

Also considered as a preventive service, and as a forerunner of sewage services, is the enterprise of the abrómicos which was started in Guayaquil in 1862. People known as abrómicos obtained their name from the containers in which they collected human refuse for cosequent disposal outside the city limits. It was a private enterprise and users had to pay for the service.

Ecuador's first piped water system was installed in Guayaquil in 1891. Quito at that time was supplied with fresh water by means of open canals which brought it from a nearby snowcapped volcano, the Pichincha. This canal system had been in use since before the arrival of the Spaniards in 1534.

Curative services

Traditionally, from colonial times through the early republican period, wealthy people received medical -- mostly curative -- care from the few persons who had some training in medicine such as the protomédicos of the ealy 1800's. The protomédicos were people with at least some theoretical training in the schools existing at that time. They differed from other medical practitioners such as the sangradores (bleeders) who had almost exclusively practical training. In later years, wealthy people either had the services of private physicians or, if needed, were interned in private clinics.

The majority of the people, primarily Indians and some whites and mestizos, could not afford the services of private physicians. If they received any medical care at all, it would have been from the curanderos (folk medicine people) or from the church in the name of charity.

The cities of Quito, Guayaquil, Cuenca, Riobamba, and Loja had hospitals. Paredes (1963) reports that by the turn of the nineteenth century there were five hospitals in Ecuador and that the number increased to 17 by 1892. Other hospitals, such as military ones, did not operate permanently because they were created or dismantled according to the needs of the moment such as the wars of the 1850-60 period or the Liberal insurgency of the 1880's and early 1890's. Sometimes military hospitals were no more than wings of an already existing hospital, reserved for military purposes.

The concept of charity predominated in most early nineteenth century thinking about public health. This type of thinking was a worldwide (or at least European and American) phenomenon, not limited to Ecuador or South America. A clear illustration of this is given by the names of the two oldest hospitals in Ecuador: that of Quito was called "Hospital de la Misericordia" (Hospital of Mercy), that of Guayaquil, "Hospital de la Caridad" (Hospital of Charity).

The hospitals of the time were mainly built to serve the most important health needs of the populace, i.e., the Indians and other poor people that lived in the main cities or fairly close to them. But that majority of the population that lived in rural areas of the country had no other recourse but its folk medicine and whatever hygienic norms it learned through the influcence of the Catholic Church.

Human health resources

In 1854 there were between 50 and 60 physicians in the nation. The

Sierra had 40 (25 in Quito, three each in Cuenca, Loja, and Riobamba, two in Latacunga) and the Costa had only 14 (11 in Guayaquil, two in Manabí Province and one in Daule). Besides doctors, the only health personnel available in hospitals before 1869 were the barchilones who acted as kinds of nursing assistants. In 1869, the Sisters of Charity arrived in Ecuador and were the first nurses to work in the country (Paredes, 1963, Vol. II; Madero, 1955). These nuns came after the National Convention of 1869 requested their services on the suggestion of the delegate Gabriel García Moreno. García Moreno, who later became President of Ecuador, is one of the best known political figures of the country, famous for his religious zeal as well as his ruthless use of power.

From Christian Charity to State Welfare, 1895 to 1960

In 1895, Liberal forces led by General Eloy Alfaro defeated in the battlefield the Conservative forces at that time in power and took over the reins of government. A detailed description of what distinguished liberals from conservatives in Ecuador is beyond the purposes of this study. Yet, it is necessary to point out that there were some basic ideological, political, economic, and regional differences between both groups.

Liberals represented the possibility of radical change at the time. Their ideological influences could at least partially be traced as far back as the Enlightenment and the French Revolution in Europe and, in the American continent, the principles embodied in the United States Constitution at that time. To a large extent, Liberals in Ecuador were also influenced by ideological currents operating in Latin America since before Independence. The writings of Nariño and Espejo alone, in what are now Colombia and Ecuador, are examples of ideals and principles later espoused and developed by Liberal thinkers. In more pragmatic terms, Ecuadorian Liberals found their main support among British commercial interests (which at that time had a powerful influence in world affairs), among the increasingly powerful merchant class of the Costa, and among people who were just fed up with the abuses and corruption of Conservative regimes.

Conservatives represented the maintenance of old political and economic structures in the nation. Their ideological influences derived mainly from the Roman Catholic Church. They had controlled the government for many years; for almost 15 years, from about 1860 to 1875, Gabriel García Moreno was the almost undisputed strongman of Ecuador and, obviously, the main defender of Conservatism. For additional support, the Conservatives relied heavily on the Church hierarchy and on the common people influenced by the Church to the point of fanaticism as well as on the traditional rich families and landowners of the Sierra.

The ascendancy of Liberals over Conservatives, to a large extent, meant that of merchants over landowners and of coastal interests over highland interests. Liberalism reduced the influence of the Catholic Church in most aspects of secular life and, at the same time, gave way to a greater participation of the state in providing public services.

In contrast to previous years in which health care services for indigents were provided out of Christian piety or charity and on a very limited scale, with the advent of Liberal governments after 1895 the idea that it is the state's obligation to maintain health and to make available services to the largest number of people possible started to take hold. The words beneficencia (beneficence or welfare) and asistencia (assistance) replaced misericordia (mercy) and caridad (charity) in the official lingo. A most insightful comment on the Latin American conception of public health in the

1930's is given by a publication of the Pan American Health Organization. According to it, the provision of health services was still dominated by the paternalistic attitude of people in power, and health services to the very poor were still "regarded as a matter of gracious charity, not as a human right," and, in addition, "much time was to pass before it was understood that this 'charity,' in the way it was dispensed through the welfare organizations, was really financed by the recipients themselves" (Pan American Health Organization /PAHO/, 1973:18).

The antecessors of some of the largest present-day public health institutions were created in the last years of the nineteenth century. The Ministerio de Instrucción Pública, Justicia, Estadística y Beneficencia (Ministry of Public Instruction, Justice, Statistics and Welfare) was created in 1884. The Junta Nacional de Asistencia Social y Beneficencia Pública (National Board of Social Assistance and Public Welfare) was created around 1896 as a "decentralized" or "autonomous" institution.* Its main function was to coordinate the work of welfare boards being set up around the country, especially the Welfare Board of Guayaquil and Social Assistance Board of Quito, both of which were also autonomous institutions. At the time, the main responsibility of these welfare boards was to administer public facilities such as hospitals, asylums (institutions for the mentally ill), and cemeteries.

In 1925, the Ministerio de Provisión Pública, Asistencia Social y Trabajo (Ministry of Public Welfare, Social Assistance and Labor) was created.* Among the multiple functions of this ministry was that of public health care. Only in 1926, after three decades of Liberalism, was the state's obligation to provide medical and health services to the population made into law (Erickson et al., 1966:48).

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* Decentralized institutions in Ecuador have different degrees of autonomy. They respond directly to the executive branch of government and are sometimes under the nominal control of a ministry. Their budgets are usually not included in the total national budget and, more often than not, special legislation has provided them with their own sources of revenue. The Tennessee Valley Authority in the United States resembles some Ecuadorian autonomous institutions.

An overview of health conditions

By 1906 the population of Ecuador had grown to an estimated 1.4 million inhabitants, almost doubling the 1861 number of 839 thousand. The city of Guayaquil had approximately 82 thousand inhabitants, having increased about 57 thousand since 1861; in contrast, Quito, the nation's capital, had only 52 thousand, just about 17 thousand more than in 1861. Migrations from the Sierra to the Costa were partly responsible for the faster growth of Guayaquil as compared to Quito. The scarcity of arable land in the Sierra and both the increment of trade and of agricultural production on the Costa were some of the determinants of such population movements.

During the first half of the twentieth century, the population of Ecuador increased rather slowly. Although reliable data are not available, it appears that it took the country over 40 years to double its estimated 1906 size. The main determinant of such slow growth was undoubtedly the extremely high incidence of mortality, which is indicated by the scattered pieces of information available. For instance, the country's crude death rate in 1920 is estimated at 28.9 per thousand (Sanders, 1972:2).

Low levels of health were, in turn, a dramatic manifestation of the low standard of living of the large majority of the people. Scattered reports show an awareness that factors associated with poverty were related to numerous illnesses which produced much loss of life, especially

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* Its name was changed to Ministerio de Previsión Social y Trabajo (Ministry of Social Welfare and Labor) in 1940.

among children. In the early 1940's, for instance, the greatest health problems faced by public health institutions in Ecuador were the prevalence of tuberculosis, malaria, and ankilostomiasis. Tuberculosis was particularly prevalent among ill fed individuals, affecting huge segments of the population (Ecuador, Ministerio de Previsión Social y Trabajo /MPS/, 1943). Similarly, there were repeated outbreaks of exanthematic typhus, a disease that thrives in cold weather and in conditions where poverty and crowding prevail.

Before the 1930's, when systematic campaigns to eradicate various diseases started, severe epidemics of smallpox, yellow fever, and cholera were frequent, some of them yearly, throughout all of Ecuador.

The government's limited knowledge of social conditions

One of the foremost limitations of the period was the lack of accurate data on the social conditions which a health policy would need to consider as its base. That disease was everywhere appeared obvious, however, there was very little accurate information on incidence, causes, fatalities produced, and so on. In the absence of reliable statistics, the problem of health was usually described in very general terms in governmental reports. As a consequence, proper planning was made impossible. Yet, a growing awareness of a serious "health problem" is present since the 1920's.

The system of data collection, some of them relevant to health, improved significantly by mid-century. The first vital statistics reports covering the whole nation were published in the late 1940's. Two local censuses, one in Quito and another in Guayaquil were conducted in 1947 and 1948. The first national population census was taken in 1950. The census, since then taken every 12 years, yields data whose knowledge is crucial for the appraisal of health conditions, planning, and the making of policy decisions concerning health.

Preventive care: institutions and activities

Some important developments occurred in the first decades of the twentieth century: 1) the creation of sanitation and hygiene institutes in Quito and Guayaquil, starting in 1903, and the setting up of sanitary boards in other provincial capitals; 2) the 1908 unification of the Sanitary Service with headquarters in Guayaquil, followed by the 1914 creation of a subdirectorate in Quito, and 3) the post-1918 work of the First Yellow Fever Commission, sent by the Rockefeller Institute, which had remarkable effects in reducing the incidence of yellow fever in the country. These developments indicate a growth of consciousness regarding public health. They also represent the typical legalistic approach to national problems by which an institutional administrative apparatus is set up at the outset, even when adequate financing and human resources are slow to come.

There is very little documented information on public health activities before 1940. This could indicate a relative lack of those activities, but certainly it demonstrates a lack of the need for public accountability and planning. Notwithstanding, one important health institution, the Dirección Nacional de Sanidad e Higiene (National Sanitation Directorate) was created around 1930. This large autonomous institution, under the supervision of the Ministry of Social Welfare, had its headquarters in Guayaquil and had jurisdiction over the whole country. In 1944, however, it was decentralized somewhat by the creation of two Inspectorias Técnicas (Technical Supervision Offices) one in charge of a cluster of northern and central provinces and the other of several southern provinces. Also, the National Sanitation Directorate was expanded through the creation of Provincial Sanitation Boards.

At first, the National Sanitation Directorate was primarily responsible for controlling the spread of epidemic diseases either through environment sanitation or mass immunization campaigns. In later years and before the creation of the Ministry of Public Health, the National Sanitation Directorate served as a Secretariat of Health within the Ministry of Social Welfare. It theoretically coordinated the work of about 50 agencies of the ministry which worked in the health field.

After 1940, documentation regarding public health activities mounts dramatically, indicating perhaps a need to respond to domestic and international pressures for more accountability and, more important, a growth in actual number of public health related institutions. The creation of more public institutions and corresponding growth of official bureaucracy in Ecuador could be interpreted as reflecting greater permanent concern for the health needs of the majority of the people. Yet, it could also be seen as a political phenomenon with little relevance to public health care. It is very likely that -- as Jaguaribe (1969) points out in his study of the Brazilian political process -- the creation of white collar jobs in Ecuador was a strategy of the national government designed to benefit its largely unemployed middle class clientele in exchange for the latter's political support rather than a measure to improve the administration and provision of publich health services.

The main public health institutions created after 1940 are described below.

The Instituto Nacional de Higiene (National Institute of Hygiene) "Leopoldo Izquieta Pérez" started its operations in the early 1940's (founded in 1941). Its main functions were "the sanitary and quality control of foods, drugs, and cosmetics, the production and storage of vaccines, and performing many types of laboratory examinations" (Favin, 1973:184).

The Instituto Nacional de Nutrición (National Institute of Nutrition) was created in 1948 with the principal objective of carrying out research in the area of nutrition, training specialized personnel, and preparing nutrition education materials for use in schools around the country. One of the immediate practical objectives of the Institute, according to a Legislative decree of 1949, was to launch a campaign against endemic goiter. Yet a quarter of a century later, little had been done in this area; this despite the fact that the National Institute of Nutrition started its work in 1950 with excellent prospects: it received significant contributions from the Pan American Health Organization, the Kellogg Foundation, as well as the public sector in Ecuador.

In keeping with the national tendency to create autonomous organizations under the National Sanitation Directorate, several other institutions were created for the purpose of combating specific epidemic diseases, among them: the Ecuadorian Antituberculosis League, the National Service for the Eradication of Malaria, and the Yellow Fever Institute.

Outstanding among the above mentioned institutions, particularly because the incidence of tuberculosis was very high in those years,* was the Liga Ecuatoriana Antituberculosa (LEA, Ecuadorian Antituberculosis League) created in 1942. The National Congress provided it with its own sources of revenue, consisting primarily of taxes on imports and exports. Its main functions were curative. The preventive aspect was apparently in the charge of a related institution, the National Antituberculosis Service. In fact, however, the main organization fighting this disease was the Antituberculosis League. By 1951, it had under its control three isolation hospitals, three sanatoriums, 17 dispensaries, and two survey centers, as well as especially assigned rooms in hospitals run by the Public Assistance in some areas, a total of 1200 beds (MPS, 1951).

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* For instance, by 1950, Ecuador had about three thousand deaths annually attributed to tuberculosis.

During the 1950-53 period, the National Directorate of Health started a campaign to vaccinate people against various infecto-contagious diseases, especially against typhoid fever, measles, whooping cough, and diphtheria (MPS, 1953:153). Also in 1952-53, many small scale campaigns to fight epidemic diseases were carried out mainly in Quito.

Several international organizations became active in the provision of health services in Ecuador, among them the Pan American Health Organization, the International Labor Office, the InterAmerican Cooperative Service of Public Health, and the United Nations International Children's Emergency Fund (UNICEF).

The Andean Mission was created in 1954 by the International Labor Office. Its purpose was the "integration of highland Indians into national life." Among the works it performed was minor health care, teaching better hygienic habits such as latrine construction, trash burning and burying, DDT spraying, and so on (Favin, 1973:183). The health functions of the Andean Mission, however, were stripped away in the 1970's after the creation of the Ministry of Public Health.

The InterAmerican Cooperative Public Health Service, a United States organization, started operations in Ecuador after the two governments signed a 1942 Basic Agreement. According to the agreement, the Service was responsible for the execution and maintenance of specific public health projects previously subscribed by it and the Government of Ecuador. The original agreement lasted only a couple of years but was successfully renewed up to the early 1960's. This institution operated with funds from both the United States and Ecuadorian governments and, to a lesser extent, from some municipal governments and welfare institutions of Ecuador. For example, in the 1954-55 operation year, the Services' budget included 8,040,000 sucres from the Ecuadorian Government and about 4 million sucres (200,000 U.S. dollars) from the United States Government (MPS, 1951:81; 1955:285). The Service worked in several areas of health, sometimes cooperating with national agencies, and sometimes independently. Among them were the following: 1) campaigns to eradicate infectious diseases; 2) provision of drinking water systems and sewerage facilities to several cities; 3) construction and equipment of various hospitals; 4) other health related activities such as contributions for health education. It supported the National Nursing School in Quito.

UNICEF's active participation in Ecuador started in 1949 when it cooperated with relief efforts for the victims of a severe earthquake which hit several central provinces. UNICEF's efforts were aimed primarily at children affected by the catastrophe. After 1949 the Ministry of Social Welfare, in collaboration with UNICEF, extended children's health coverage to most of the nation's provinces. Their work concentrated on four main aspects of children's health and welfare: 1) improving diets; 2) provision of medical equipment and supplies to nursing homes and children's hospitals (six in total); 3) vaccination against tuberculosis;* 4) development of a tuberculosis laboratory for a Diagnostic Center in Guayaquil.

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* As part of a worldwide campaign against tuberculosis, UNICEF began vaccinating Ecuadorian children in July of 1950. Ecuador's Antituberculosis League collaborated in the campaign. It was the first mass immunization in Ecuador using the vaccine B.C.G. (MPS, 1951:114-116).

Curative care: institutions and activities

A turning point in the participation of the state in providing predominantly curative health services came in 1908 when the extensive properties of the Catholic Church, particularly landholdings, were expropriated and put under control of the National Board of Social Assistance and Public Welfare. Thus the government directed the revenues of such landholdings to programs of public service. Since most expropriations were made in the Sierra, the provincial social assistance boards formed in that region consequently tended to have more income than those provinces of the Costa.

By 1960, the Board of Social Assistance operated 12 hospitals, four urban medical dispensaries, and six rural health centers. In addition, and despite its lack of sufficient funds in later years, it contributed substantially to the support of other organizations working in the field of health, among them the Red Cross, the Blood Bank, and the National School of Nursing (MPS, 1962:118).

Under the Ministry of Social Welfare, an autonomous institution called the Instituto de Previsión (Institute of Prevision) was created in 1935. The Institute of Prevision was in turn subdivided into the Caja de Previsión (white collar social security) and the Caja del Seguro (blue collar social security). One of the main responsibilities of both social security institutions was to provide medical services to their affiliates. The Medical Department of the Ecuadorian Social Security, created in 1936, started as a subsidiary of the blue collar branch of the Institute of Prevision but, in 1944, its coverage was extended to include also the white collar branch, and in 1951, besides covering active members, health care services were also provided to retired affiliates.

The government, by a law decree of July 16, 1958, made the Medical Department an autonomous institution, with its own legal representation and proper status and regulation. At the top of this health organization were two Directorates, one in Quito and the other in Guayaquil. Each of these was under the supervision of a Medico-Administrative National Council, made up of representatives of the Ministry of Social Welfare, the Institute of Prevision, and Social Security (Ecuador, Instituto Ecuatoriano de Seguridad Social /IESS/, 1975).

The Medical Department of Social Security played an important role in the provision of health services, primarily curative care, to a small but influential sector of the population. Its services reached almost exclusively urban white collar workers as well as some blue collar workers. By 1960, for example, only 3.6 percent of the total population were affiliated with the national social security system and entitled to its medical care services.

The importance of the Medical Department was therefore not so much due to the proportion of people it covered but rather to its economic power since it was financed by public, private, and individual member contributions. The Medical Department, unlike other national health institutions, was usually able to implement its programs, unhindered by financial problems. It directly operated a large network of hospitals and other health care facilities and also provided services through surrogate facilities to its affiliates.

Evaluation of Pre-1960 Public Health Policy

The development of public health policy up to 1960 has, of necessity, been only briefly sketched and mainly concerned with the organizational parameters being set up in this work. Besides being concerned with an extremely long period of time, it is limited by plain lack of available data.

Achievements

The state's concern with public health in Ecuador, for all practical purposes, started after 1895, with the coming to power of various Liberal regimes. They adopted the principle that the state is obligated to provide for the health needs of the population, especially of the large proportion of poor who could not afford the cost of private medical care. They also provided sources of revenue for institutions such as those under the National Board of Social Assistance and Public Welfare, which had an important role in restoring health to those afflicted by illnesses.

After the 1930's, regimes which were not necessarily Liberal but rather of varied political tendencies, became increasingly concerned with public health matters and created numerous institutions to deal with particular problems at the national level.

A rough idea of how the public health institutions under the Ministry of Social Welfare were related to each other by the late 1950's is given in Figure 2. Solid lines suggest various degrees of actual control while broken ones indicate a mostly nominal relationship.

Deficiencies

Despite the progress made, there were a series of deficiencies in public health policy making in the period under consideration. Some of the main deficiencies were: 1) lack of planning and coordination, 2) preference for curative over preventive health care, 3) lack of adequate funds and personnel, and 4) concentration of services in urban areas.

Lack of planning and coordination

As seen in Figure 2, the health functions of the Ministry of Public

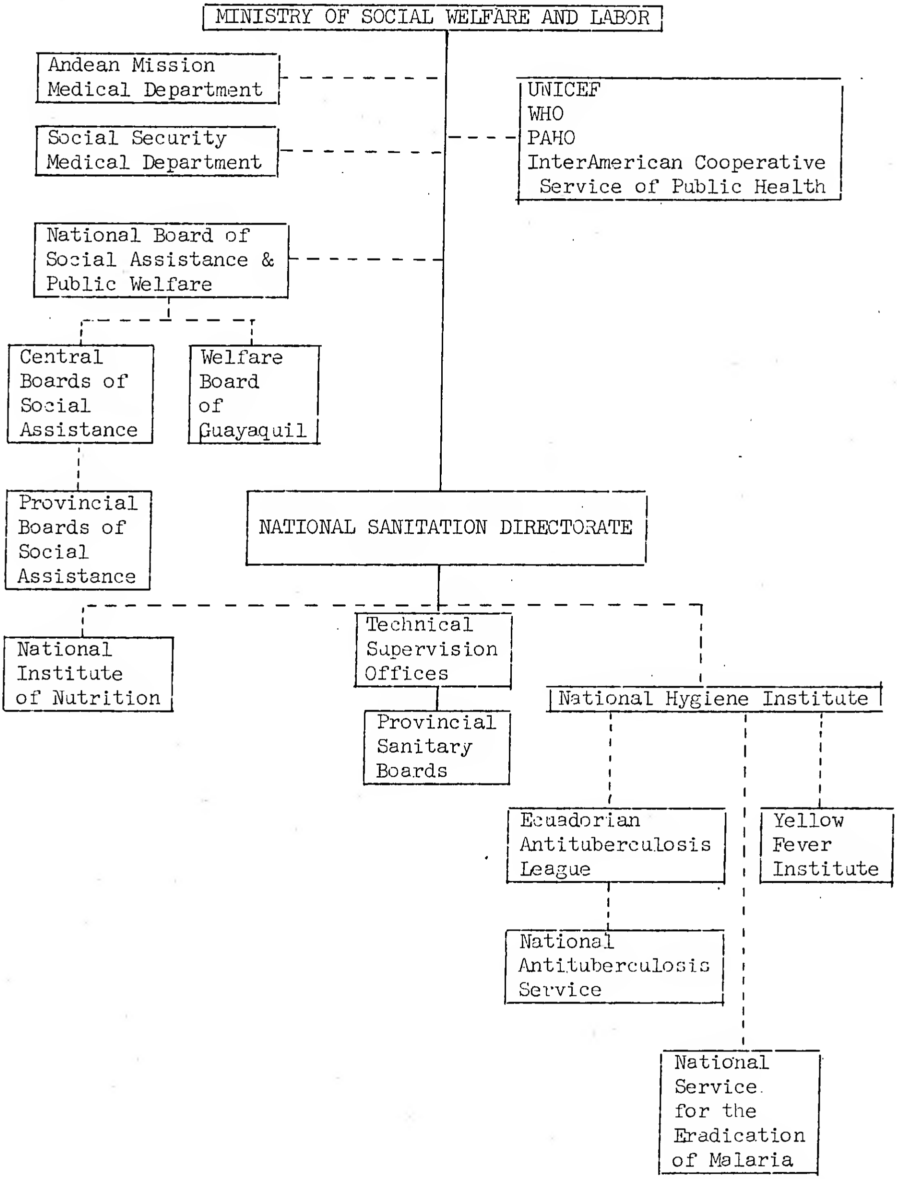
MINISTRY OF SOCIAL WELFARE AND LABOR
Andean Mission Medical Department
Social Security Medical Department
UNICEF
WHO
PAHO
InterAmerican Cooperative Service of Public Health
National Board of Social Assistance & Public Welfare
Central Boards of Social Assistance
Welfare Board of Guayaquil
Provincial Boards of Social Assistance
NATIONAL SANITATION DIRECTORATE
National Institute of Nutrition
Technical Supervision Offices
Provincial Sanitary Boards
National Hygiene Institute
Ecuadorian Antituberculosis League
Yellow Fever Institute
National Antituberculosis Service
National Service for the Eradication of Malaria

Figure 2. Approximate Organogram of the Public Health Institutions of the Ministry of Social Welfare and Labor, c. 1955.

Welfare were distributed among many institutions, some of them decentralized or autonomous, without effective channels of communication.

Although the National Sanitation Directorate supposedly was intended to coordinate health (mainly sanitation or preventive) policy, very little coordination actually occurred. Each health agency constituted a world in itself. They seldom cooperated with one another and often there was duplication of effort (i.e., Servicio Nacional Antituberculoso and Liga Ecuatoriana Antituberculosa).

Campaigns to eradicate epidemics were sporadic affairs. One year the campaign was carried out in one area, another year in another area. It was usually triggered by an outbreak of a particular disease. There was no systematic follow-up. For example, in 1950 there was an outbreak of yellow fever in the towns of Santo Domingo, Quinindé, and Esmeraldas, even though the Yellow Fever Service had declared it eradicated from those areas.

The National Board of Social Assistance and Public Welfare was similarly incapable of coordinating the curative efforts of the provincial welfare boards. And thus, the two strongest institutions, the Social Assistance Board of Quito and the Welfare Board of Guayaquil, worked independently in their particular domains.

No general health plan was yet envisaged. Diseases were attacked individually as if health were the product of unrelated factors. The approach to some health problems was not holistic but atomistic. Thus, one witnesses the creation of autonomous agencies to control particular diseases such as malaria, yellow fever, tuberculosis, etc.

Preference for curative over preventive health care

Among the first health organizations to be created were the boards of social assistance which were in charge of running welfare centers and hospitals. These boards had a more secure financial basis than most of the other health agencies created thereafter, particularly those whose function was to prevent the appearance of epidemics. Even some institutions such as the LEA which was partly responsible for the prevention of tuberculosis, at the outset dedicated large portions of its budget to curative aspects, mainly, building hospitals for treatment and isolation of tuberculosis patients, equipping laboratories, etc.

Lack of adequate funds and trained personnel

Next, and perhaps one of the most important problems affecting health action before 1960, was the lack of funds and trained personnel. The lack of adequate financing for the few health programs in existence was officially pointed out as far back as 1943 when it was reported that there were not enough funds for the campaigns to eradicate contagious diseases (MPS, 1943:27). By 1948, another official report (MPS, 1948) indicated the many problems affecting the population's health services: lack of money, low salaries, lack of communication and transport, lack of specialized personnel, etc. Most of these problems are summarized as lack of money and lack of personnel. Certain health agencies such as the boards of social assistance were relatively self-financing; they had revenues from the exploitation of landholdings. For example, the Central Board of Social Assistance of Quito received about 6,180 million sucres (roughly over US $300,000) in 1949 from either direct exploitation or rent from its landholdings (MPS, 1949). In many cases, however, the income of the social assistance boards did not match their expenses and thus required special budget allocations.

One of the agencies which did not suffer as much from lack of funds was the LEA because its income was derived from a congressionally legislated tax on imports and exports. By 1943, the LEA had received about two million sucres since its creation in 1942.

The situation of other health agencies, which depended directly on annual budget allocations was much worse. The national budget was continually in deficit, and social services such as health were often the first ones to suffer cuts. The lack of funds is dramatized in a report which states that many provincial health (or sanitation) inspection centers were so broke that they could not even mail their usual report to the Ministry! (MPS, 1954:159-160).

The lack of skilled personnel is illustrated in the following case. In 1950, the National Yellow Fever Service was assigned 300,000 sucres (about US $15,000) for a campaign against yellow fever. The money, at first, was not used because there were no trained personnel to carry out the campaign. A Brazilian inspector arrived in Ecuador to help in the training of personnel, yet no real work was done because he did not speak Spanish. Part of the money (70,000 sucres) was then used for other purposes such as paying salaries, for a vehicle, and for supplies (MPS, 1951:121).

Concentration of services in urban areas

Health services were almost exclusively concentrated in the two largest cities -- Quito and Guayaquil -- and in a few other provincial capitals. The curative services such as hospitals and immunization centers were invariably located in urban areas. Also, most of the campaigns to eradicate contagious diseases were carried out in urban areas, unless there was an epidemic outbreak. Then the affected area would be the focus of attention. In 1950, for example, the National Sanitation Directorate, the overall health agency, reported that the fight against yellow fever in urban areas was progressing very well, that the disease had completely disappeared in Guayaquil and that by the end of the year its incidence in the country would be practically nil.

Meanwhile, it also reported cases where sanitary campaigns went to certain rural areas to control outbreaks which had already occurred but not to carry on the preventive work (MPS, 1950:38-39).

The Director of the Board of Public Assistance of the Coast reiterated frequent complaints of his institution about the lack of attention of the central government to the health needs of the peasant and rural populations of the coastal region. He indicated that the rural population lacked both medical attention and medicines, and that with a few notable exceptions, the canton governments (municipios) were not concerned with the life conditions of their inhabitants (MPS, 1955:323).

By the end of 1949, there was an important plan to reorganize and give new impetus to health work in Ecuador, particularly its sanitation and preventive aspect. This was called the "Plan of Transformation."

Dr. Alfonso Campuzano, one of the health officials who proposed the plan, in a later report to the nation stated that the then existing Provincial Sanitary Boards did not meet the hygienic, sanitary, and educational objectives they were supposed to meet. And then, in a sort of summary of the health system's drawbacks worth quoting extensively, he stated:

> I have seen that the major obstacle to reach those objectives is the impossibility of finding professionals (physicians) whose point of view corresponded with that of the social services called 'sanitary units,' oriented specifically to give hygienic education. preventive medicine, health and hygiene. Almost all physicians working in the provinces have a definite

> leaning towards curative medicine, setting aside completely the hygienic and sanitary social problems that they should face as Provincial Sanitary chiefs. On the other hand, the lack of registered nurses and nurses specializing in Public Health make the situation even more difficult. They are usually recruited from the group of relatives and friends of the health officials, not taking into account at least the fact that they could be trained. The sanitary inspectors with wrong attitudes do not perform but a police function not being able to intervene otherwise for lack of programs and practical preparation, despite the fact that some of them had gone through the courses for sanitary inspectors which have taken place in Quito. The physical plants destined to these services have been chosen among the most inadequate ones and this is another reason for their lack of results. The equipment is the most deficient and is in absolute deterioration in almost all zones....(MPS, 1951:144).*

The "Plan of Transformation" had intended to create "sanitary units" at the provincial seat level, canton seat level, and mobile units to serve the rural areas. Each unit was to be staffed by skilled medical personnel, those at the provincial level were to be the better staffed, with two physicians, two dentists, two sanitary inspectors, two obstetricians, two social workers, and two nurses; the rural mobile units, the least staffed, would have had one representative of the above-named professions. In other words, the idea was to have fairly complete teams of health workers serving areas of the nation. The urban areas were given preference but the rural ones were also expected to benefit from it. This plan, while certainly idealistic (for where was Ecuador going to find enough health personnel to staff all the one hundred or so cantons, let alone rural units to serve the larger and more dispersed rural population?), envisioned a radical and much needed organization to face the health needs of the nation. These ideas could have been set into operation gradually, starting perhaps at the level of the more populated cantons to then reach other areas. However, this ambitious plan (partly described in MPS, 1950:

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* Translated from the Spanish by the author.

120) was scratched because the National Congress eliminated this item from the national budget! (see MPS, 1951:15).

The Ecuadorian Sanitation Directorate was, in the words of a health official, like a fire station without equipment: "It is called to fight fires but to its great shame, it goes to fight them without water, without ladders, without water hoses" (MPS, 1955:246).

Besides plain scarcity, then, public health policy in Ecuador before 1960 suffered from serious misplacement of priorities. This is further illustrated by another official report which indicates that by the early 1950's, infant mortality in the capital of the country was "shameful," being perhaps one of the highest among countries. Yet, instead of openly facing this problem, the government had been planning to spend millions of sucres in the creation of an organization to fight cancer. The main causes of death in Ecuador were diseases of the respiratory system, on the one hand, and diseases of the digestive tract on the other. Both groups of diseases took a great toll on children's lives. By 1953, the death rate due to diseases of the respiratory system (excluding tuberculosis) was 289.74 per thousand; that due to diseases of the digestive tract was 265.41 per thousand, meanwhile the death rate due to cancer and other tumors was only 75.52 (MPS, 1953:190-191).

CHAPTER III
PUBLIC HEALTH POLICY PROGRAMMING SINCE 1960

The present chapter deals primarily with the elaboration of national health plans as well as the creation of institutions of public health. Both of these governmental actions are here defined as programming. This definition follows Ugalde's (1973) typology in which the series of decisions which are made for the attainment of a goal can be classified into two types of decisions: (1) programming and (2) implementation.

Programming decisions are those made during the process of converting policy goals into programs while implementation refers to decisions made during the implementation of the programs.

A Period of Reforms

At the turn of the 1960's Latin America became involved in talk of change and reform. The Cuban Revolution sent waves across the continent with a clear message of basic structural change as a solution to the great problems affecting that part of the world. The United States' program for controlled, non-violent reform, the Alliance for Progress, was officially adopted by the majority of Latin American nations at the Punta del Este Conference in 1961. This was the continental response to the questions posed by the Cuban events. Playing up the reform theme, the Punta del Este Charter tended to raise expectations for a new kind of life, with less backwardness and higher standards, among the Latin American nations.

The principles adopted at Punta del Este had special significance for public policy. They not only encouraged the utilization of research (to gather reliable information on each country's conditions) and general economic planning but, in addition, stated the need to incorporate the social sectors into development planning. And this latter decision was of great importance to public health (see PAHO, 1973:22).

Ecuador was no exception to the new feelings of change. In 1960, President José María Velasco Ibarra was elected by a large majority of votes after a campaign in which he stressed a program of territorial restoration and basic social change. After 15 months in power, Velasco was replaced by his Vice-President, Carlos Julio Arosemena Monroy. Arosemena increased the people's expectation for radical reforms through his insistence that the archaic structures of the nation should be altered. But like his predecessor, he only remained in power for less than two years. In March 1963 he was overthrown by a Military Junta that committed itself to carry out the reforms contained in the Alliance for Progress program.

All three governments espoused one or another form of programs of social and economic change. The emphasis was on economic matters yet social aspects, such as improving health care, were also considered as essential for overall development.

As noted in the previous chapter, for many years there had been a clamor for a reorganization of public health services as well as for giving them greater national priority. Health officials, legislators, medical professionals, and, in general, people who realized the low levels of health in the nation, pressed for change. Lack of sanitation facilities was perhaps the most serious problem at the time. A 1962 official report, for instance, indicates that in the previous year Ecuador's population at large did not have pure drinking water in sufficient quantities. This lack contributed to the maintenance of enteric diseases and other epidemics. In addition, only a few cities had adequate systems of sewage disposal; some provincial capitals and cities of over 20 thousand inhabitants had sewerage systems which did not meet the required minimum standards. The rest of the nation, from some provincial seats to canton seats and other localities, had practically no facilities to eliminate waste. The absence of sewerage services provided fertile ground for the spread of typhoid fever, intestinal parasites, and enteric diseases in general (MPS, 1962:ix).

Reforms in the public health sector were slow to come, but some important steps in that direction were taken in this period. In 1960 the anti-malarial campaign was entrusted to the InterAmerican Cooperative Public Health Service. It had been faltering under the direction of the National Service for the Eradication of Malaria (SNEM), therefore, the government, on the recommendation of several public health agencies, made an agreement with the InterAmerican Cooperative Public Health Service by which the latter absorbed the SNEM and took over its basic functions (MPS, 1961:171-175, 282).

The fight against epidemic diseases in general was centralized in 1961 under the direction of the National Department of Epidemiology. This institution absorbed several zonal offices and autonomous agencies previously in charge of combating contagious and epidemic illnesses. It was created as part of the National Sanitary Service and had three subdivisions, corresponding to the Central, Litoral, and Southern Zones (MPS, 1961:109-110).

All the developmental and reformist ideas of the early 1960's began to materialize into specific plans and programs for public health. Public health planning received a lift with the 1962 creation of the Junta de Programación de Salud Pública (Public Health Programming Board). In addition, planning was facilitated by the findings of the 1962 national population and housing census.

In 1964, the Junta Nacional de Planificación y Coordinación Económica (National Planning Board) formulated Ecuador's first National Development Plan. The general purpose of this plan was to set the country on a route of social and economic progress through a series of basic structural changes such as an agrarian reform, tax reform, and educational reform.

The 1964 National Plan of Public Health

Conceived as part of the National Development Plan of 1964, the Public Health Plan began with a diagnosis of the prevailing medical and sanitary conditions in the nation. Among other things, it pointed out: (a) the lack of preventive health work, (b) the extremely high rates of infant mortality, (c) the need to control diseases of early infancy and childhood, (d) the inefficiency and unequal distribution of the sanitary and assistential medical services, and (e) the scarcity of personnel, equipment, and funds for the majority of existing services. It also stated that national problems received little help from the multiplicity of institutions and public health sponsoring agencies, which added together, numbered more than 50. The privilege of autonomy that many of them enjoyed was seen as an obstacle to efficient health service.

The Public Health Plan set as major goals several improvements in the fields of health and sanitation: (1) to reduce morbidity and mortality, particularly among the infant population; (2) to increase health care coverage in order to achieve within a decade a ratio of seven physicians per 10,000 population and 3.6 beds per 1,000 population as well as the creation of health centers in all cantons, medical dispensaries in all parishes, and health posts in parishes and other small population centers; (3) to improve rural health conditions through environmental sanitation and campaigns against communicable and infectious diseases; (4) to establish programs favoring the integration of medical services, and (5) to prepare skilled health personnel.

In addition, the Public Health Plan had several organizational objectives, among them, (a) the creation of the Ministry of Public Health, (b) the coordination of all health services until the creation of the National Health Service, (c) the unification of the Medical Department of the IESS with the National Sanitation Directorate, and (d) the continuation of public health planning (JNPC, 1968).

Being the first of its kind in Ecuador, the Public Health Plan had some shortcomings, perhaps because of the relative lack of experience of the people involved in its formulation. It established ambitious goals but lacked details on programs and the means of implementation. For the most part, it was too general. Nevertheless, it represented an important step forward and set the basis for future endeavors in the field of planning.

The Institute of Sanitary Works

One of the first achievements of the Public Health Plan was the 1965 creation of the Instituto Ecuatoriano de Obras Sanitarias (IEOS, Institute of Sanitary Works), attached to the Ministry of Social Welfare. The IEOS succeeded the InterAmerican Cooperative Service of Public Health which for over 20 years (1942 to 1964) had operated in Ecuador.

The main functions of the IEOS were, first, to elaborate and execute programs for the short and long terms in order to solve problems related to the provision of potable water and sewerage in the cantons and parishes of the Republic; this was to be done in collaboration with the municipalities* and other entities in charge of the provision of such services, thus avoiding the scattering of resources; second, to supervise the work being done by other institutions in order to evaluate the progress of the National Plan of Potable Water and Sewerage.

The Water and Sewerage Plan, included in the 1964 National Development Plan, set as main objectives the provision of potable water services to 39 percent of the population and sewerage to 34 percent in a ten year period. These objectives were rather ambitious in view of the fact that, according to a 1961 Sanitary Survey, only about 19.5 and 14.3 percent of the population surveyed (a total of 655 localities between canton and parish seats) had satisfactory water and sewerage systems. By 1964, it was estimated that the percentage of population properly served with potable water and sewage disposal were 20 and 14.7 respectively (Montalvo, 1972:21).

In terms of residential distribution, most work promoted by the IEOS was to be concentrated in urban areas as this was economically more convenient, however, it also tried to meet the needs of the rural inhabitants that made up more than half the total population (Bahamonde, 1972:7).

The new emphasis on environmental sanitation by sewerage systems construction and the provision of pure drinking water was bound to have a very significant effect on the levels of health of the population.

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* Ecuadorian legislation states that certain municipal revenues must be used exclusively for the provision of potable water and sewerage systems. However, those laws were seldom complied with and funds were spent for other purposes.

According to IEOS estimates, the above-named services alone could reduce the number of deaths due to transmissible diseases from one to two per thousand annually (MSP, 1969:115).

Throughout the existence of the IEOS, the central government has stressed its priority status regarding budget allocations. For example, in 1972, it decreed that the amount of money designated in the national budget for the IEOS not only be disbursed in full but also increased both in 1972 and 1973 (MSP, 1973:29). Nevertheless, when actual disbursements had to be made, it was not unusual to find that the amounts given were below those originally assigned in the budget. Thus, in 1967 and 1968 the IEOS was supposed to receive a budget allocation of 20,000,000 sucres (about US $1,000,000) each year. This amount was agreed under the law which created the IEOS. However, in 1967 the allocation was reduced to 11,000,000 sucres and at the end it only received 7,450,000 sucres. In 1968, again the allocation was reduced to 11,000,000 sucres. The figures for the actual amount received are not available (see MPS, 1968:81, 84).

In 1973, it was estimated that satisfactory services of water and sewerage were provided to 31.4 and 23.6 percent respectively of the country's population, with the exception of the cities of Quito and Guayaquil* (MPS, 1973:29-30).

The importance of IEOS functions and its recognition by the public sector was stressed again in 1973 when an executive decree guaranteed its economic solvency in the future by establishing adequate revenues both from utilities derived from oil exploitation as well as from other direct fiscal allocations. The decree also created a "rotating fund" to be used for credit grants to urban communities in good financial standing as well as for the execution of programs in rural areas.

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* Quito, Guayaquil, and a few other cities have their own water and sewerage systems which operate under municipal boards.

The División Nacional de Sanidad del Medio Ambiente (Division of Environmental Sanitation), created in 1972, had functions fairly similar to those of the IEOS. This agency was directly under the Ministry and was apparently brought to life in an effort to centralize decision-making in sanitation matters. Its basic mission was to solve in an overall, massive way the sanitary problems of the country in cooperation with the different institutions working in the field (MSP, 1973:25; 1975:15).

The Division was subdivided into 25 executive offices: one working on the national level, four on the regional level, and 20 on the provincial level.

The purpose for the creation of the Division of Environmental Sanitation was to have an institution directly under the Ministry in charge of coordinating overall sanitation policies. Yet, in fact, this duplicated effort and the relative weakness of the Division as compared to the IEOS did not really bring about the desired centralization. The IEOS continued operating as an organization with a large degree of autonomy which had a dynamism of its own, hardly matched by any other institution in the field of sanitation.

The Ministry of Public Health

A landmark of public health policy-making in Ecuador was the creation of the Ministry of Public Health by the Assemblea Constituyente (Constitutional Assembly) on June 6, 1967. This was the first step toward a much needed reorganization of the health delivery system of the nation.

The law regulating the Ministry of Public Health's structure and functions gave it numerous responsibilities. The Ministry was supposed to work for the promotion, reparation, and rehabilitation of individual and collective health; it was charged with dealing with problems of nutrition, housing, alcoholism, and drug addiction. It was also to carry out programs of social assistance, sanitation, and hygiene.

Although the Ministry of Public Health was given a wide range of functions, from the time of its creation to 1972, it did not have the necessary authority to direct the activities of the many institutions which, with varied degrees of autonomy, operated in the area of public health. The central and provincial boards of social assistance, for instance, acted as sorts of small ministries, capable of setting different policies, independent of any national norm. Before the Ministry could direct or at least coordinate the activities of the autonomous institutions, there had to be changes in national legislation, as each institution was backed by specific laws (MSP, 1968, 1973).

In his 1969 Annual Report to the Nation, Francisco Parra Gil, Minister of Public Health, pointed out the lack of proper structural organization of the public health sector, its unequal coverage of the population's health needs, and the insufficient use of the resources available at the urban level. He insisted that in order to solve these problems it was necessary to start integrating those agencies previously under the nominal control of the Ministry and to establish a better coordination with those autonomous institutions in charge of health. At the same time, it was necessary to improve the access to health services for the people who so far had remained marginated from them, namely the inhabitants of the rural areas and small towns. The above policy, the report continued, was deemed even more important in light of the deterioration of the population's health as indicated by increasing rates of mortality due to "reducible damage" or diseases which could be controlled by public health measures. In effect, the rates of general mortality had exhibited an annual decline of 2.5 percent, but while mortality due to non-reducible damages had decreased to about 3.32 percent annually, mortality due to reducible damages had increased about .96 percent. This rather paradoxical fact was explained by the virtual abandonment of preventive health services on the one hand and by the technological improvements adopted for the curative-assistive medical services. Mortality rates were still largely due to infant and maternal mortality. These were good indicators of the poor levels of health of the population at large. The high infant and maternal mortality rates were attributed to the lack of professional attention during gestation, pregnancy, and early childhood. Only about 20 percent of all births occurred with professional attention. Moreover, in Pichincha and Guayas (provinces with the two largest cities), the percentage of births with medical attention was over 40, but in the rest of the provinces it did not surpass 12 (MSP, 1969:11,12).

Under the principle that health is a right that should be enjoyed by all Ecuadorians wherever they live, in 1969, the Minister of Public Health stated as main objectives of his administration the following: (1) the study and preparation of the organic law of the Ministry and its regulations, aiming at the integration of the Sanitation and Social Assistance institutions under the Ministry as well as the coordination of their services with those of the autonomous public health organizations, and the execution and supervision of programs; (2) the study and preparation of a health code; (3) the formulation of a law for the obligatory iodization of salt for human consumption, in order to eradicate endemic goiter, and (4) the formulation of a national health plan and the approval of the Rural Medicine Plan (MSP, 1969:12,13).

The Rural Medicine Plan

Throughout national life, the public sector had generally neglected the health needs of rural inhabitants despite the fact that they represented the majority of the country's population. In 1962, for example, according to the national census, the population living in rural areas represented about 75 percent of the total.

Permanent health services were completely absent in the rural areas of the country. With the few exceptions of communities reached by the medical services of the Andean Mission and the scattered activities of the so-called "Vertical or Central Command Campaigns," whose purpose was to combat outbreaks of epidemic diseases, modern preventive and/or curative health services were unknown among rural inhabitants (MSP, 1968:15).

In order to extend public health action to the rural areas and to promote community development, in 1969, the Ministry formulated the Plan of Rural Medicine as part of a more general National Health Plan. The main objectives of the Plan of Rural Medicine were two: a) to provide complete health services to all 63 canton seats of the Republic (improving some, creating others); and b) to create a health infrastructure in all parish seats. The first step was to provide "health subcenters" with a physician on the staff, to 300 parish seats in the 1969-72 period (MSP, 1969:14, 15).

Since attracting professional medical personnel to work in the rural areas had always been a problem in Ecuador, as in other nations of the world, the Government decided to create special legislation requiring all newly graduated professionals from health related centers of higher education to serve a year of rural practice before they could obtain an officially registered degree. The Law, decreed on July 8, 1970, affected graduates of medical, dental, obstetrics, and nursing schools.

In 1973, three years after the Law was formulated, there were 172 physicians, 82 dentists, 71 nurses, and 16 obstetricians fulfilling their duties in the rural areas of the country. There were also some 132 nursing assistants and 73 sanitary inspectors.

The Plan of Rural Medicine was carried out mainly by the Ministry of Public Health, but the Medical Department of the IESS, the Armed Forces, some municipalities and other institutions also cooperated with it (MSP, 1973).

The Health Code

The Health Code, one of the principal objectives of the Ministry from its creation, was published in June 1971. According to its own definition, the Health Code constituted a detailed record of the rights, duties, and norms relative to the protection, development, reparation, and rehabilitation of individual and collective health (Ecuador, Registro Oficial, 1971). This was a very significant event in the history of policy-making in Ecuador. For the first time there was a body of principles dealing with medical care, sanitation, and related matters at the national level. Before the Health Code there had been a sanitary code but it was antiquated and its subject matter coverage was limited.

The 1972 Reorganization

The National Health Directorate

Several years after its 1967 creation, the Ministry of Health was still a handicapped structure. It did not have sufficient authority and power of policy implementation due to its poor degree of organization and, more importantly, because it controlled a very small percentage of the total health resources available to the country. In this context, it has been pointed out that:

> The Ministry of Health itself characterized the Ecuadorian health organizations as having no planning or organizational efficiency, as financing simple incremental budgets by deficit spending, and as being staffed by few technically trained personnel and by many incompetent people (Favin, 1973:178).

The Ministry's power expanded significantly after a number of changes were introduced by the military government that took control in February 1972. Of foremost importance was the April 1972 Government decree abolishing some autonomous public health bodies, incorporating their services under the control of a new Dirección Nacional de Salud (National Directorate of Health) and integrating other health institutions into the Ministry. This decision gave the Ministry some real coordinating ability and eliminated what up to that point together constituted the largest public health organization in the nation -- and thus the greatest obstacle to a unified health structure -- the boards of social assistance. In April 1972, the central and provincial boards of social assistance ceased to exist. Their bureaucracies, resources, and services were transferred to the Ministry of Health. Through the same decree, the Ministry obtained control of previously independent local health-integrating boards (such as those of Cañar and Santo Domingo de los Colorados).

The newly formed National Directorate of Health was subdivided into four health regions (Central, Coast, South, and Manabí) and several technico-administrative divisions. While planning and the setting of technical standards were centralized, the actual execution of health care programs were decentralized (Registro Oficial, No. 48 of April 25, 1972; Favin, 1973:179). The organization of the Ministry of Public Health at the beginning of the year 1973 is shown in Figure 3.

Further centralization occurred when an executive decree of December 1973 ordered the abolition of the Ecuadorian Antituberculosis League and incorporated its services and facilities into the Ministry of Public Health. Only then did the Ministry achieve control of over 50 percent of all hospital beds in the country. The Ministry's direct control of the hospital beds available in the country went from three percent before April 1972, to 48 percent after April 1972 and to 56 percent in December 1973.

Institutional Changes in Sanitation

In order to reduce duplication of efforts, to reinforce the existing technico-administrative mechanisms, and to accelerate programs of hospital construction and environmental sanitation, in May 1974, it was officially decreed that both the Ministry's Division of Environment Sanitation and the IEOS be restructured.

The IEOS was given additional functions and, to carry them out, received the transfer of human and material resources belonging to the Ministry's Division of Sanitation. The expanded functions of the IEOS included constructing water and sewerage systems as well as designing and building medical and other health care facilities such as hospitals and medical dispensaries (Registro Oficial, No. 554 of May 16, 1974).

The incorporation of the Division of Sanitation into the IEOS had the purpose of eliminating alternate structures which were doing basically the same job. By joining a weak structure to a stronger one, the coordination and actual execution of sanitary programs was facilitated. However,

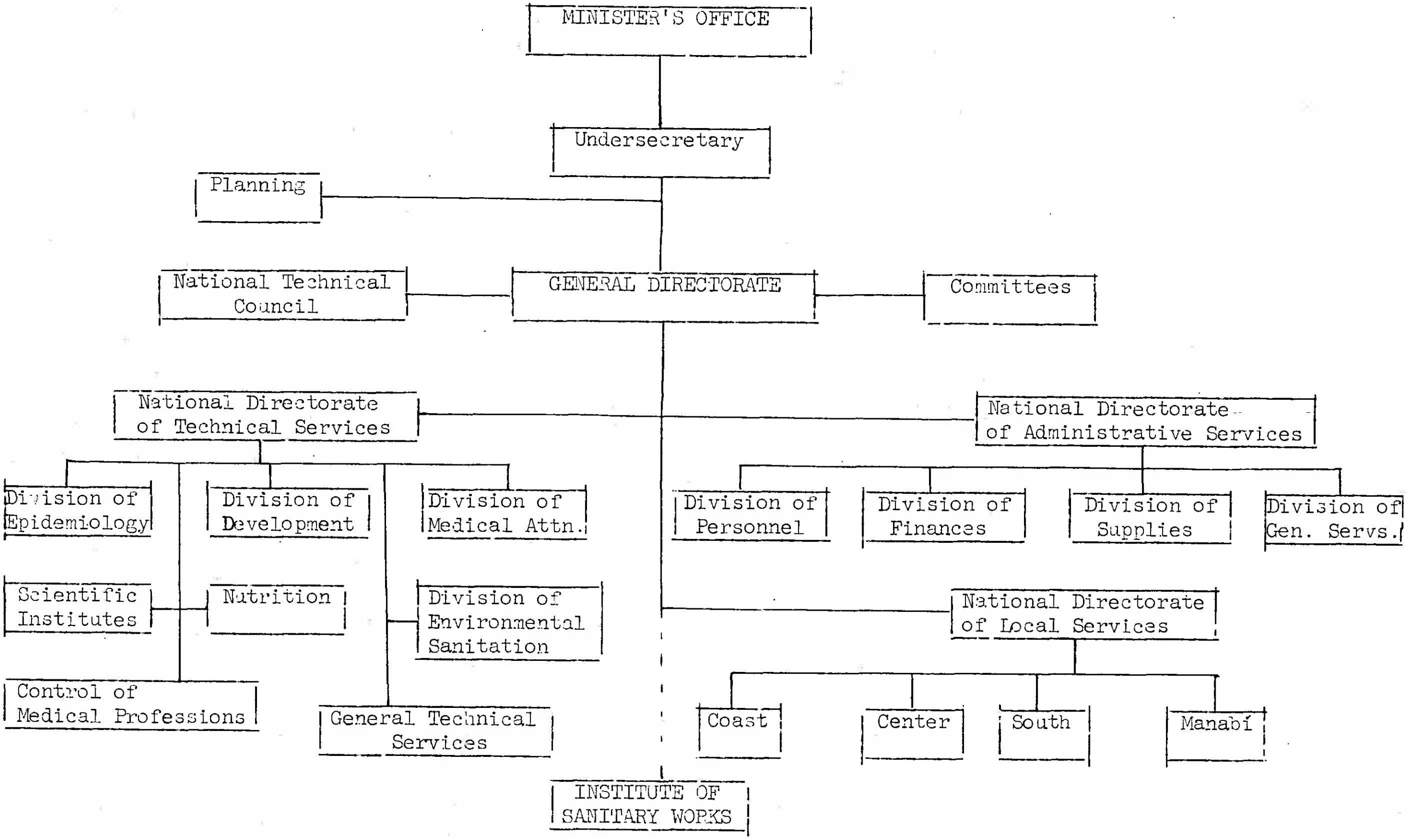
MINISTER'S OFFICE
Undersecretary
Planning
National Technical Council
GENERAL DIRECTORATE
Committees
National Directorate of Technical Services
National Directorate of Administrative Services
Division of Epidemiology
Division of Development
Division of Medical Attn.
Division of Personnel
Division of Finances
Division of Supplies
Division of Gen. Servs.
Scientific Institutes
Nutrition
Division of Environmental Sanitation
National Directorate of Local Services
Control of Medical Professions
General Technical Services
Coast
Center
South
Manabí
INSTITUTE OF SANITARY WORKS

Figure 3. Organogram of the Ministry of Public Health, 1973.
Source: Adapted from JNPC, 1973:179.

it constituted an act of decentralization contrary to the trend begun with the creation of the Ministry and which essentially aimed at the unification of all public health services under the control of the Ministry of Public Health.

About a year later, in an apparent effort to return its decision-making functions in sanitary affairs to the Ministry of Health, an executive decree of April 9, 1975, created the Undersecretary of Environment Sanitation and Sanitary Works as a dependency of the Ministry (Registro Oficial, No. 778 of April 9, 1975).

The National Medico-Social Directorate of the Social Security Institute

From 1958 to 1970, the Medical Department operated as an autonomous entity under the nominal control of the Social Security and was supervised by the Medico-Administrative Council. In 1970, when the social security system was reorganized, the Medical Department maintained its autonomy, but was tied to the newly created Instituto Ecuatoriano de Seguridad Social (Social Security Institute, IESS) and was supervised instead by the Superior Council of this new organization.

An executive decree of November 1974 stripped the old Medical Department of its autonomy and put it directly under the authority of the IESS. It then became the Dirección Nacional Medico-Social (Medico-Social Directorate) and was subdivided into national and regional offices with headquarters in Quito and Guayaquil respectively (IESS, 1975:3).

By 1974, the Medico-Social Directorate of the IESS had 67 health care facilities under its direct control (including four hospitals, eight clinics, and a variety of health dispensaries) and offered medical care services through 302 other surrogate facilities (ranging from hospitals to out-patient clinics). The population entitled to its services represented six percent of the national total (IESS, 1975). In 1976, the health care services of the Medico-Social Directorate were also expected to benefit, in addition to active and retired members, the immediate relatives of the members: parents and children.

The National Health Plan, 1973-77

The military government that came to power in February 1972 defined itself as "nationalistic" and "revolutionary." In its publication *Filosofía y Plan de Acción. . .* (JNPC, 1972a), the government explained its position, pledging to bring about some substantial structural changes to the nation. Within a year, through its National Planning Board, the government published the Integral Plan of Transformation and Development 1973-77, in which it provided a fairly detailed account of the policies to be followed during a five-year period. The Plan touched almost all areas of life in Ecuador, from finances to the rural structure, education and health. In its prologue, it indicated that, considering both the historical process of internal domination and the external factors which have conditioned Ecuador's present state of underdevelopment, it became indispensable to create, first, a decision-making power which considers structural transformation as a requisite to achieve authentic development, and, second, a structure of political power in which there is greater active participation of groups which had been marginal to the political system (JNPC, 1972b:x).

The Plan contained two specific sections pertinent to public health: the program of potable water and sewerage and the program of health.

The Program of Potable Water and Sewerage

The Program of Potable Water and Sewerage, briefly summarized, attempted to maintain public health by means of 1) the provision of water and sewerage services to the majority of the country's population, and 2) to preserve water resources by controlling pollution of rivers and the ocean. The basic goals for the 1972-77 period were to provide satisfactory water and sewerage services to 50 and 40 percent of the population respectively. Disaggregated in terms of residence, the aim was to provide the population of urban areas with 80 and 70 percent of water and sewerage services respectively and the population rural areas with 24 and 14 percent of water and sewerage services respectively.

As noted above, the goals for rural areas were lower than those for the urban areas. This, the Program noted, was due to the fact that the construction of integral sanitary systems is technically and economically feasible only in concentrated nuclei of population. The IEOS was entrusted with the function of coordinating the development of the Water and Sewerage Program.

The estimated investment necessary for the five year program amounted to 2,153 million sucres (about US $86,140 million at 1972 values), 65 percent to be used for potable water and 35 percent for sewerage systems (JNPC, 1972b:337-341).

The Health Program

The Health Program, whose execution was entrusted to the Ministry of Public Health, aimed primarily at the study and solution of national health problems. Its main purposes were 1) to create an agile, modern, and efficient health system, to be achieved after a process of reorganization of the technico-administrative structures already in existence; 2) to organize a health system with a criterion of integrality (wholeness), and 3) to establish a National Health Service by 1977.

The Health Program additionally listed a series of objectives, among which the most important were: to improve health levels of the population (reducing infant and maternal mortality, increasing general life expectancy), to increase health care coverage at all levels and especially in the rural areas, to improve the performance of available services, and to seek a greater participation of the medical-related professions in the public health programs being carried out (JNPC, 1972b: 381-388).

Besides the programs formulated as part of the Plan of Transformation and Development, the military government, still in power in 1975, made some other pronouncements of significance for public health. It officially recognized the right to health as one of the main rights of Ecuadorian citizens. It further developed the concept of integral health and pointed out that it constituted the basis of a public health policy designed to provide services to the individual from birth to death, whether he (or she) is health or ill, and wherever he (or she) resides. Health was to be given priority as a fundamental factor of development (MSP, 1973).

Short and Medium Term Programs

Since the Health Plan for the 1973-77 period outlines only the main points of the new public health policy, the Ministry of Public Health decided to formulate the Plan PAIS 1974-77.

The Plan PAIS was made up of a series of specific programs for operation during both short and medium terms. The several Divisions of the Ministry were ordered to elaborate programs of action at the provincial level as well as at the level of operational units (i.e. health centers). These programs, together with different technical and administrative norms formulated by the Ministry were expected to contribute directly to the organization and execution of the National Health Plan.

Among the norms adopted by the Ministry was that of requiring the use of a Historia Clínica Unica (Clinical History File) in health establishments having a hundred beds or more. The Clinical History File aimed at the elimination of confusing practices which up until then tended to maintain more than one file for the same patient. This practice, along with other improvements in the collection of data, was to lead to far better health statistics and therefore improved bases for decision, evaluation, and control (MSP, 1975:1, 2).

Conclusion

Many of the general observations made in reference to pre-1960 public health policy are also pertinent to the post-1960 period. After all, no radical change occurred at the turn of the decade. The year 1960 has been used as a dividing line only for purposes of this study. The amount of information available for the latter period is much greater than for the earlier years and programming decisions are much more frequent.

Achievements

Post-1960 public health policy programming indicates that very basic and significant steps have been taken by the government toward solving the serious health problems affecting the population and toward creating a permanent and responsive structure which contributes to the maintenance of better health conditions in Ecuador.

First, in terms of official public statements, after 1960, there was increasing talk about basic reforms in the public health structure. The points most frequently emphasized have been the need for both greater coordination among institutions working in the field and greater attention to the health problems affecting the rural population, which makes up over 50 percent of the nation's total. In the last few years, and particularly since 1972, the government has reiterated that public health is a national priority, that it constitutes a basic right for all Ecuadorians, and that it is officially seen as an integral process involving not only curing illness but also its prevention in order to allow people to live healthier and longer.

Second, regarding public health data, the post-1960 period witnesses a marked official interest for finding out about the life conditions and characteristics of the country's inhabitants. There have been two national population and housing censuses, one in 1962 and another in 1974, both of which provide a wealth of information relevant to public health. In addition, there have been several surveys designed to tap specific health aspects, among them, the 1961 sanitation survey, a mid-1960's endemic goiter survey, and several annual health resources and activities surveys. The improved work of the National Statistics Institute undoubtedly has also contributed to better knowledge of public health matters.

Third, partly due to a post-1960 trend which stressed the importance of planning for socio-economic development and partly due also to better national statistics, official plans and programs multiplied. There were two national public health plans, the first of this kind ever, one in 1964 and another in 1973. In addition, specific health programs were elaborated, i.e. of rural medicine, of potable water and sewerage, and numerous small and medium term programs for the activities of the various departments of the Ministry of Public Health.

Fourth, in terms of the organization of public health structures, the most outstanding post-1960 developments are the 1965 creation of the Institute of Sanitary Works, the 1967 creation of the Ministry of Public Health, and the abolition of important previously autonomous institutions such as the Ecuadorian Antituberculosis League and the Boards of Social Assistance, whose resources and functions came under the Ministry of Health's control. This period was one in which some degree of coordination in health policy-making was achieved and, especially after 1972, when the Ministry gained ascendancy over other public health institutions. A further factor indicating better structural organization after 1972 was the fact that, contrary to the five previous years when there were about a half dozen ministers, from 1972 to 1975, only one person held the post, Raúl Maldonado Mejía.

Deficiencies

Much needed progress occurred from 1960 to the mid-1970's, but many of the problems and shortcomings which characterized the pre-1960 era were still at work. For one thing, there was a clear lack of coordination of public health policy in Ecuador. Important medical care and sanitary institutions such as the Medico-Social Directorate of the Ecuadorian Social Security Institute, the Welfare Board of Guayaquil, the National Hygiene Institute, and the Institute of Sanitary Works continued operating as autonomous agencies, outside the direct control of a central structure of health decision making. The lack of cooperation was so strong in some cases that even the collection of statistical data was made difficult by the lack of unified reporting practices.

Reorganization for some public health institutions meant disorganization to the point of inactivity. For instance, the National Institute of Nutrition, after being partially incorporated into the Division of Nutrition and the Ministry of Health, lost control of its budget and lacked proper direction. When queried about the activities of his institution, one public official declared that the INNE "ha tenido casi dos años de receso" (has been inactive for almost two years).*

The programs elaborated since 1960 have been carried out only partially. In only very rare instances have they achieved the goals they initially set forth. One of the most poignant illustrations is the program of iodization of salt. In 1968, the government directed the iodization of salt for human consumption as a measure to fight endemic goiter (and its sequel, cretinism). Yet by the end of 1975 the law was still not fully implemented. The prevalence of goiter in large areas of the country continued unabated.

One of the key public health programs of the period, that of rural medicine, was being carried out only in a very limited way. There was lack of funds, lack of facilities, lack of personnel, and most of all, lack of vision. Where a national crusade was needed, there were only poorly implemented programs. Where full official commitment was essential, there was only rhetorical interest but practical neglect.

The neglect of rural areas by decision-makers in Ecuador can be explained at three different levels: 1) Because of its limited available resources, the country has given priority to investment for social development in urban areas, where the populations are concentrated, and therefore can be easily served, and where usually there already exist some works of infrastructure which are necessary for the creation of services such as hospitals and clinics. Rural areas, whose populations are relatively dispersed and where there are almost no previous infrastructural works, are therefore deprived of public investment. 2) At the level of political action, rural inhabitants -- made up mainly of peasant agriculturalists of Indian descent, living in extremely low social and economic conditions -- have tended to be relatively unable to articulate their demands and to organize into effective pressure groups. This inability is partly the consequences of factors such as distance which makes communication among rural communities very difficult. But most of all, it is a consequence of centuries of domination of the predominantly Indian rural people by the predominantly white and mestizo urban people. Thus, 3) at the level of the structure of society in Ecuador, rural areas have been neglected because that is the logical consequence of the prevailing conditions of internal colonialism (for details on the concept of internal colonialism, see Gonzáles-Casanova, 1969; Stavenhagen, 1969). Urban areas represent the dominant metropoles which exploit their counterparts, the dependent, colonial rural areas. Urban areas therefore are the main beneficiaries of the social services, including public health care, provided by the state; in contrast, rural areas are either forgotten or given a low second priority.

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* Personal communication of Dr. Ribadeneira, official of INNE.

CHAPTER IV
PUBLIC HEALTH POLICY IMPLEMENTATION: THE DIFFERENTIAL DISTRIBUTION OF HEALTH SERVICES

This chapter studies Ecuador's public health policy in terms of its implementation. After the previous analysis which stressed public health programming from 1960 to the early 1970's, the present emphasis is on national budget allocations for public health as well as the regional and provincial distribution of public health services such as water, sewerage, hospitals, and clinics.

Expenditures on Public Health

Ecuador's expenditures on public health have traditionally been very small. This is largely due to the fact that the country is poor. Its poverty or low level of economic development was particularly acute before the oil boom, when the gross domestic product ranged from only US $841 million in 1960 to US $1816 million in 1972. As a consequence of the post-1972 exploitation of newly discovered oil which coincided with the rise in the world prices of the commodity, Ecuador's economic situation began to improve. Its gross domestic product increased sharply, reaching US $2498 million in 1973 and US $3475 million in 1974 (Banco Central, 1975). Yet, as the figures indicate the country is still economically underdeveloped.

Lack of resources is only one of the reasons why Ecuador's expenditures on public health have been small. Another very important reason is the low priority which public health has been given by past national governments. Public health budget expenditures have usually represented less than five percent of the total expenditures of the central government. In 1972, for instance (see Figure 4), Ecuador's budget expenditures on public health represented only 2.4 percent of the total; in contrast, other Latin American countries selected for comparison had budget expenditures on public health ranging from 3.5 percent of the total in Argentina to 12.4 percent in Venezuela.

Since most of the study of Ecuador's budget expenditures* is based on initial budget figures rather than on those revised at the end of each fiscal year, it is necessary to include a word of caution before proceeding further: there are no data available on the exact amount of money spent on public health during a given year. 1) Initial budget allocations to public health are only an approximation of what actual expenditures would be; particularly before 1972, they were usually only statements of aspirations because the central government was seldom able to deliver the amounts indicated in the budget law. 2) The publication of annual budget allocations seldom includes those made to the different autonomous and semi-autonomous institutions operating in the health field.**

Expenditures of the Central Government

Ecuador's government expenditures on public health (Table 2) increased

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* The Presupuesto Nacional del Estado...(National Budget of the State...) is usually published before the beginning of each fiscal year.

** A rare tidbit of information on the matter is given by an official report which indicates that the 1962 net expenditures on health were nearly 319 million sucres, of which 24.7 million corresponded to the central government, 55.7 to the municipalities, and 239.2 to other entities (JNPC, 1964:105). This information is significant also in that it illustrates discrepancies between officially reported figures. The 1962 central government expenditures on public health previously mentioned are only about 25 million sucres, in contrast with those reported by the Inter-American Statistical Institute (see Table 2) which are 65 million.

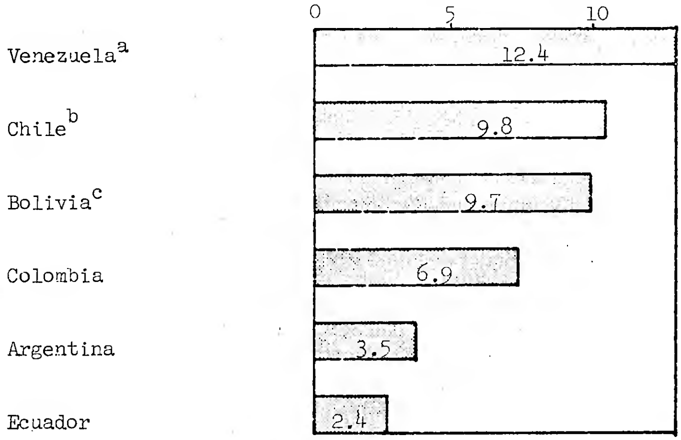

Figure 4. Government Budget Expenditures on Public Health as a Percent of Total Expenditures in Selected Latin American Countries, 1972

a) Includes social welfare.
b) Social services only.
c) Central government expenditures.

Source: Elaborated from data in OEA, IHE, 1975: Table 406-01.

Table 2. Central Government's Annual Budget Expenditures on Public Health, Number and Percent, Ecuador, 1960-1975

Year[a]	Expenditures on Public Health (In Millions) Sucres	U.S. Dollars[b]	Percent
1960	55	3.1	3.1
1961	52	2.9	2.5
1962	65	3.6	3.5
1963	85	4.7	4.0
1964	88	4.9	3.1
1965	157	8.7	5.0
1966	95	5.3	3.4
1967	96	5.3	3.2
1968	99	5.5	2.4
1969	91	5.1	2.0
1970	149	6.0	2.6
1971	166	6.6	2.8
1972	155	6.2	2.4
1973	785	31.4	8.4
1974	822	32.9	5.1
1975	805	32.2	5.4

Source: Organización de Estados Americanos (OEA), Instituto Inter-Americano de Estadística (IIE), 1968, 1974; InterAmerican Development Bank (IDB), 1974; El Mundo, Octubre 1975; Banco Central, 1973; Registro Oficial, 1962-68; Ecuador, Ministerio de Finanzas (MF), Oficina Nacional del Presupuesto (ONP), 1970-75.

a) Expenditures correspond to fiscal year (January - December) plus a complementary period of three months.

b) From July 14, 1961 to August 16, 1970, the official rate of exchange was 18 sucres per US $1.00; since August 16, 1970, the rate has been 25 sucres per US $1.00.

from about 50 million sucres (US $7.8 million) in 1960 to over 800 million sucres (US $32 million) in 1975. The greatest jump occurred from 1972 to 1973 when it went from 155 to 785 million sucres or from US $6.2 to 31.4 million. Undoubtedly, the priority given to public health by the military government under President Rodríguez Lara (that reorganized the Ministry of Public Health in April 1972) and the new oil revenues of 1973 are the main factors contributing to this drastic increase.

In relative terms, the data in Table 2 indicate that public health expenditures ranged from 2.0 percent of the total budget in 1969 to about 8.4 percent in 1973. Public health's proportional share of the national budget reached its highest levels in 1965, 1973, 1974 and 1975 (with 5.0, 8.4, 5.1, and 5.4 percent respectively). Apparently, these increases occurred while military dictatorships ruled the nation and around the time when national health plans had been elaborated. Military Juntas took power from civilian governments in 1963 and 1972; the national health plans of 1964 and 1973 were elaborated shortly after each year. Contrary to expectations, the creation of the Ministry of Health in 1967 did not bring about any substantial increase in public health expenditures. Rather, there was a relative decrease from 3.2 percent in 1967 to 2.4 in 1968 and down to 2.0 in 1969.

Expenditures of Autonomous Health Institutions

The health boards (ex-boards of social assistance)

The health boards, now under the direct control of the Ministry of Health, are analyzed together with other autonomous health institutions because they succeeded the central and provincial boards of social assistance which operated in an autonomous way for over half a century until

April 1972.*

The annual budget expenditures of the provincial health boards increased from about 25 million sucres (US $1.4 million) in 1962 to over 274 million (US $11 million) in 1972 and 721 million sucres (US $28.8 million) in 1975 (see Table 3). Before 1970, the highest figure corresponds to 1966 (48.62 million sucres), representing about 51 percent or half of the total amount reported that year as the government's expenditure on public health. The budget expenditures for the 1970-72 period are much higher than those reported for previous years and, when compared to government expenditures on public health, appear to surpass the latter by over 60 percent each year.

The IEOS, Institute of Sanitary Works

The IEOS, one of the most important autonomous institutions in the nation, has had relatively large amounts of annual budget expenditures since its creation in 1965. From an estimated 92 million sucres (US $5.1 million) in 1966, its expenditures increased to about 1,077 million (US $43.1 million) in 1975. In two years, 1967 and 1975, they surpassed those of the central government by 26 and 34 percent respectively.

The National Medico-Social Directorate (ex-Medical Department) of the IESS

Also shown in Table 3 are the annual budgets of the National Medico-Social Directorate of the IESS. For several years, and particularly from 1965 to 1972, this institution appears to have outspent the central govern-

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* When they were known as boards of social assistance, these public health institutions derived their income from ordinary and special central government budget accounts as well as from their participation in specific tax revenues and from profits from their capital holdings (such as landholdings and shares in LIFE, a pharmaceutical company).

Table 3. Annual Budget Expenditures of Selected Autonomous Institutions of Public Health, Number and Percent of Total Government Health Expenditures, Ecuador, 1960-1975

	Expenditures (Million Sucres)[b]			Percent of Total Government Expenditures		
Year[a]	Health Boards[c]	IEOS	Médico-Social Department of the IESS	Health Boards	IEOS	Médico-Social Department of the IESS
1960	n.a.		43[d]	n.a.		78
1961	n.a.		28[d]	n.a.		38
1962	25		31[d]	38		48
1963	27		31[d]	32		36
1964	28		89	32		100
1965	29		181	18		115
1966	49	92[e]	210	51	97	221
1967	39	121	294	40	126	306
1968	35	93	145[d]	36	94	146
1969	n.a.	n.a.	296[d]	n.a.	n.a.	325
1970	243	114	383	163	77	257
1971	269	90	431	162	54	260
1972	274	113	513	177	73	331
1973	303	244	508	39	31	65
1974	539	548	649	66	67	79
1975	721	1077	n.a.	90	134	n.a.

Source: Registro Oficial, 1962-68; ONP, 1970-75; MSP, n.d.; IESS, n.d.; Instituto Ecuatoriano de Obras Sanitarias (IEOS), 1975.

a) Expenditures correspond to fiscal year (January - December) plus a complementary period of three months.

b) From July 14, 1961 to August 16, 1970, the official rate of exchange was 18 sucres per US $1.00; since August 16, 1970, the rate has been 25 sucres per US $1.00.

c) 1962-68, initial budgets; 1970-72, revised budgets.

d) Author's estimate based on IEOS, 1975: Anexo 3.

e) Partial information; complete figures not available.

ment on health care. The contrast becomes greater when one considers the fact that the ex-Medical Department was serving only its members -- a population representing six percent or less of the national total -- while the central government was supposed to be serving all the country's inhabitants!

Regional and Provincial Differences

There are very few data available on public health expenditures for subdivisions of the country. However, some comparisons among provinces and regions are possible through the use of data on budget expenditures of the public health boards and investments of the IEOS. As observed in Table 4, from 1962 to 1974, the budget expenditures of the health boards increased from 25 million (US $1.4 million) to about 540 million sucres (US $21.6 million). In terms of per capita expenditures, the health boards' figure in 1962 was 5.6 sucres per capita (US $.30) and, in 1974, 82.9 sucres per capita (US $3.30).

The 1962 expenditures of the health boards of the highland provinces reached 16 million sucres (7.4 sucres or US $.40 per capita) in contrast to those of the coastal provinces, which were seven million (3.5 sucres or US $.20 per capita) and the eastern provinces, which were two million (18 sucres or US $.10 per capita). Individually, Galápagos and Zamora Chinchipe were the provinces with the highest health boards' per capita expenditures (165 and 43.6 sucres or US $9.20 and 2.40 per capita respectively). Despite the fact that the Province of Guayas had over one fifth of the country's population in 1962 (see Table 1), its health boards' expenditures in 1962 were very low (a total of 1.4 million sucres or US $.01 million, corresponding to 1.4 sucres or US $.01 per capita). It should be pointed out, however, that in Guayas there is a very strong autonomous institution working in the public health field, the Welfare Board of Guaya-

Table 4. Total and Per Capita Budget Expenditures of the Public Health Boards, 1962 and 1974, and Investments of the IEOS by 1974

Region Province	Public Health Boards' Expenditures^{a} (Million Sucres) 1962		1974		IEOS' Investments (Million Sucres) by 1974^{b}	
	Total	Per Cap.	Total	Per Cap.	Total	Per Cap.
NATION	25.10	5.6	539.36	82.9	117.15	18.0
Sierra	16.05	7.4	339.85	108.3	32.81	10.5
Azuay	1.95	7.1	37.02	100.8	7.06	19.2
Bolívar	.76	5.7	10.10	69.6	.11	7.6
Cañar	.89	7.9	15.82	109.1	1.00	6.8
Carchi	1.04	10.1	12.94	106.9	.89	7.4
Cotopaxi	1.09	7.0	15.21	67.3	1.37	6.1
Chimborazo	1.80	6.5	23.63	77.7	2.24	7.4
Imbabura	1.19	6.8	20.27	93.8	4.19	19.4
Loja	1.67	5.9	26.09	76.3	.51	1.5
Pichincha	4.19	7.1	153.74	155.6	15.01	15.2
Tungurahua	1.47	8.2	25.03	90.0	.43	1.5
Costa	7.46	3.5	179.87	56.6	82.42	26.9
El Oro	1.59	9.9	19.19	76.3	4.73	18.0
Esmeraldas	.91	7.3	14.31	70.5	9.07	44.7
Guayas	1.40	1.4	97.67	64.6	.87	.6
Los Rios	.89	3.6	23.03	60.1	13.30	34.7
Manabí	2.67	4.4	24.89	30.4	54.44	66.6
Oriente	1.36	18.0	15.44	88.7	1.84	10.6
Morona S.	.41	15.8	3.87	71.7	.95	17.6
Napo	.20	8.3	4.65	75.0	1.44	23.2
Pastaza	.17	12.1	2.49	108.3	.31	13.5
Zamora Ch.	.48	43.6	4.43	130.3	.00	0.0
Galápagos	.33	165.0	4.20	1050.0	.00	0.0

Source: Compiled and computed by the author from data in Registro Oficial, 1962; MSP, n.d.; IEOS, 1975; and Table 1.

a) Expenditures of the boards of social assistance before 1972.
b) Exact period covered is not available.

quil, which controls most of the health resources and facilities in the province. The majority of the other provinces, in contrast, depend primarily on the health boards and their resources.

The 1974 budget expenditures of the health boards of the highland provinces represented 63 percent of the national total, those of the coastal provinces 33 percent, and those of the eastern provinces only about three percent. As shown in Table 4, the provinces with the largest per capita health boards' expenditures were Galápagos (with an all time high of 1050 sucres or US $42 per capita), Pichincha (with 155.6 sucres or US $6.20) and Zamora Chinchipe (with 130.3 sucres or US $5.20). Manabí, the third most populous province in the nation, had a small amount of health board expenditures, representing only 30.4 sucres or US $1.20 per capita.

The IEOS data (also shown in Table 4) refer only to investments reported until 1974 and not to the total annual budget expenditures of the institution, which were 538 million sucres (US $21.5 million) in 1974. Of the total IEOS investment until 1974, the Costa received the largest amount, 82 million sucres (26.9 sucres or US $1.10 per capita); most of this investment went to Manabí, about 54 million (US $2.2 million) (66.6 sucres or US $2.70 per capita). The rest of the regions received relatively small investments.

The data available indicate that the per capita expenditures of the public health boards were the highest in Galápagos, followed in descending order by the Oriente and Sierra provinces and with the Costa provinces at the bottom. In contrast, the per capita investment of the IEOS was higher in the Costa provinces than in either the Sierra or Oriente provinces. Galápagos, which figured very high in public health boards' per capita expenditures, had no investment reported by 1974. This province is an exceptional case because it has a very small population (about four thousand in 1974) and consequently small expenditures or investments can be translated into high ratios per capita.

Distribution of Public Health Services

Preventive Services

One of the best ways of maintaining high levels of health among the population of a given area is through prevention of disease and perhaps the most important measures of disease prevention are the provision of piped water supply and sewerage systems as well as spraying and immunizations. The lack of some of these basic services greatly increases the population's exposure to illness.

> The serious health problems created by deficiencies in water supply and sewerage systems are evident from analysis of morbidity and mortality data, particularly of young children. The group, gastritis, enteritis, etc., appears as one of the principal causes of deaths among young children of 1-4 years of age in every country /of the American continent/ for which data were available . . . .
> . . . .
> Other diseases which are water borne or spread because of an insufficient supply of water and lack of cleanliness include typhoid fever and dysenteries (PAHO, 1970:162).

In Latin America there are wide differences in regards to the proportion of each country's population served by piped water and sewerage systems. The data for selected countries presented in Figure 5, indicate that Ecuador ranked fairly low in the provision of both public services. In 1973, about 32 percent of Ecuador's population had piped water services, in contrast to about 70 percent in Chile, Colombia and Venezuela, and over 50 percent in Cuba and Argentina. Similarly, 24 percent

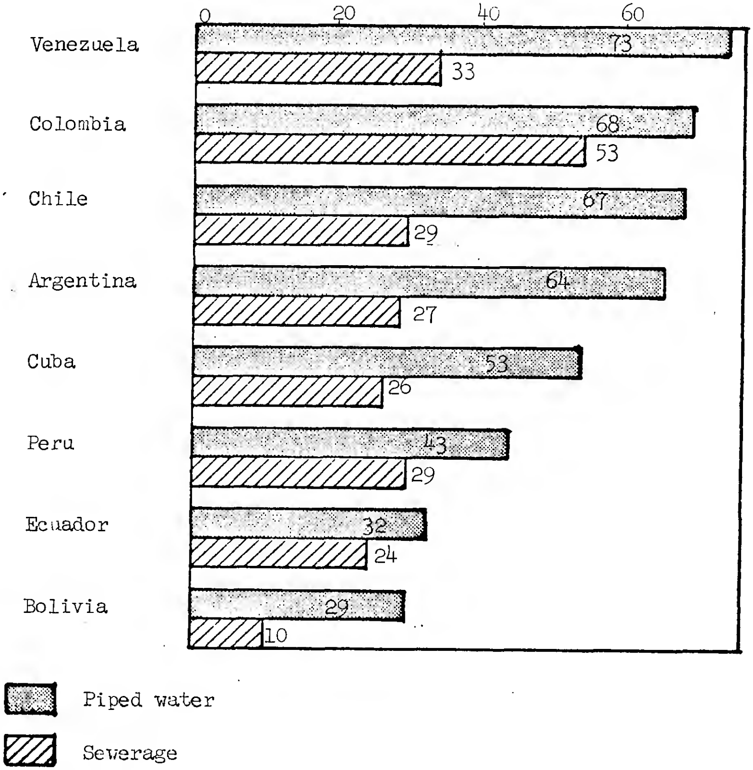

Figure 5. Percent of Population Served by Piped Water Services and Sewerage Systems in Selected Latin American Countries, 1973

Source: Elaborated from data in OEA, IIE, 1975: Table 403-01 and 403-11.

of Ecuador's population had sewerage services, in contrast to over 50 percent in Colombia and about 30 percent in Chile, Peru and Venezuela.

Ecuadorian census data on coverage of piped water and sewerage services (Table 5) do not refer directly to the population with access to such facilities but rather to the number of dwellings with house connections or easy access to them. Nevertheless, the data are useful for comparisons among regions and provinces and can serve as the basis for inferences about approximate populations served.

Piped water

The nation's proportion of dwellings with piped water services increased from 37.5 percent in 1962 to 41.8 in 1974. It can be inferred therefore that in 12 years the proportion of people exposed to diseases associated with the consumption of water from other sources (wells, rivers, lakes, and so on) had a corresponding decrease.

In 1962, the Sierra's proportion of dwellings with piped water (37.7 percent) was greater than those of the Costa (28.8) and the Oriente (12.4). Pichincha and Guayas were the only provinces having over 60 percent of their dwellings with piped water services. Of the rest of the provinces, only El Oro and Galápagos approached 50 percent.

In 1974, both the Sierra and the Costa had roughly similar proportions of their dwellings with piped water (37.5 and 35.1 percent respectively). Pichincha and Galápagos reached 73.7 and 82.6 percent respectively; Guayas, El Oro, Chimborazo, and Imbabura had about 50 percent, and the rest of the provinces had lower proportions.

Sewerage

At the national level, the proportion of dwellings with sewage disposal systems (also shown in Table 5) increased from 32.5 percent in 1962

Table 5. Water and Sewerage Services, Percent of Dwellings Served, by Province, Ecuador, 1962 and 1974

Region Province	Piped Water[a] 1962	Piped Water[a] 1974	Sewerage[b] 1962	Sewerage[b] 1974
NATION	37.5	41.8	32.5	40.4
Sierra	32.7	37.5	17.4	27.2
Azuay	23.6	30.0	17.3	26.2
Bolívar	16.1	13.2	7.6	12.2
Cañar	15.5	19.7	6.3	10.6
Carchi	38.5	43.9	15.7	35.6
Cotopaxi	27.1	22.3	9.2	11.5
Chimborazo	29.2	52.8	14.9	33.1
Imbabura	37.7	48.3	12.6	30.3
Loja	32.1	28.6	7.2	12.9
Pichincha	75.9	73.7	56.7	66.2
Tungurahua	40.0	42.7	26.5	33.6
Costa	28.8	35.1	33.9	39.0
El Oro	49.2	55.4	34.1	47.8
Esmeraldas	12.2	25.8	16.4	25.4
Guayas	60.1	52.1	65.1	62.0
Los Rios	17.9	17.4	22.7	27.0
Manabí	4.6	24.8	31.1	37.0
Oriente	12.4	18.9	10.8	15.3
Morona S.	3.4	12.6	6.2	12.9
Napo	1.8	8.0	6.9	13.4
Pastaza	26.0	34.0	26.3	34.3
Zamora Cn.	18.6	21.0	3.9	10.5
Galápagos	45.6	62.6	27.3	53.0

Source: DEC, 1964; OCN, 1975.

a) Piped Water from Public Systems; 1962 includes private installations.

b) Data for 1962 refer to toilet facilities both for private dwellings and common use connected to public sewerage systems as well as houses with latrines and septic tanks.

to 40.4 in 1974.

In 1962, the Costa had almost twice the proportion of dwellings with sewerage as did the Sierra (33.4 and 17.4 respectively). Galápagos and the Oriente followed with 27.3 and 10.8 percent. Only Pichincha and Guayas had over 50 percent of their dwellings with sewage disposal systems. The rest of the provinces had proportions which fluctuated widely, from 3.9 percent in Zamora Chinchipe to 26.5 in Tungurahua.

In 1974, the coastal region (with about 40 percent of dwellings with sewerage) continued surpassing the highlands region (whose proportion was about 27 percent) but the gap appeared smaller than in 1962. Both the Oriente and Galápagos increased their proportions to 15.3 and 53 percent respectively. Pichincha and Guayas had over 60 percent of their dwellings with such services; of the other provinces, only El Oro and Galápagos had increased to about 50 percent of dwellings with sewerage.

Immunizations

Traditionally, infectious and communicable diseases have taken a great toll of life in Ecuador. The health history of the country is full of episodes of dreadful epidemics which caused many fatalities among the population, young and old. Immunizing the people, particularly children who tend to be more susceptible to certain communicable diseases such as smallpox and poliomielitis, is one of the most significant preventive health activities which can be carried on.

The immunizations or vaccinations given for a selected number of diseases in two periods about a decade apart are presented in Tables 6a and 6b. Note that the data refer to vaccinations given, not to number of persons vaccinated. The number of persons immunized would tend to be equal to the number of vaccinations when the vaccine is given in only one

Table 6a. Immunizations Given for Selected Diseases, by Province, Ecuador, 1963-65

Region Province	Immunizations (Thousands) 1963-65 (Mean Annual Number)				
	Smallpox	DPT[a,b]	Polio[a]	Typhus	Whooping Cough
NATION	919.9	63.0	83.1	43.3	19.0
Sierra	579.6	35.2	51.7	10.7	9.4
Azuay	61.6	7.7	3.1	4.7	2.2
Bolívar	19.1	1.1	1.4	.0	.1
Cañar	35.7	1.2	1.0	1.0	.4
Carchi	34.0	1.0	1.4	.2	1.5
Cotopaxi	61.8	1.8	2.0	.0	.0
Chimborazo	58.1	3.8	5.9	.1	1.5
Imbabura	67.1	1.5	3.7	.1	1.2
Loja	40.2	1.9	1.8	1.5	.8
Pichincha	163.1	12.4	28.7	2.7	.6
Tungurahua	38.9	2.8	2.7	.4	1.3
Costa	314.0	26.6	30.1	32.3	8.9
El Oro	16.9	1.5	2.6	2.5	.4
Esmeraldas	12.0	2.8	2.6	.9	1.6
Guayas	224.4	18.0	18.6	26.3	5.4
Los Rios	24.3	1.6	2.8	1.9	.4
Manabí	36.4	2.7	3.5	.7	.4
Oriente	26.3	1.2	1.3	.3	.7
Morona S.					
Napo					
Pastaza					
Zamora Ch.					
Galápagos					

Source: Ecuador, Ministerio de Salud Pública (MSP), División Nacional de Epidemiología (DNE), n.d.

a) Complete doses.

b) DPT or "Triple" is a vaccine used against diphtheria, tetanus, and whooping cough.

Table 6b. Immunizations Given for Selected Diseases, by Province
Ecuador, 1972-73

Region Province	Immunizations (Thousands) 1972-73 (Mean Annual Number)[a]							
	Smallpox[b]	DPT[c]	Polio[c]	BCG[d]	Typhus	Tetanus	Yellow Fever	Measles
NATION	345.3	154.3	492.9	132.5	35.9	33.2	18.2	34.2
Sierra	179.2	75.6	119.3	49.2	7.6	.9	.4	1.3
Azuay	7.4	9.1	21.5	7.0	.5	-	-	-
Bolívar	6.2	3.4	.3	4.9	-	-	-	-
Cañar	4.2	4.6	14.3	2.1	1.1	-	-	-
Carchi	2.1	1.4	6.1	4.9	-	-	-	-
Cotopaxi	3.7	5.3	4.6	-	-	-	-	-
Chimborazo	18.4	7.4	6.4	10.4	-	.7	-	-
Imbabura	5.8	4.2	8.1	1.5	-	-	-	-
Loja	9.6	8.3	8.9	4.3	2.3	-	-	-
Pichincha	108.8	29.1	40.0	8.4	2.6	.2	.4	1.3
Tungurahua	13.2	2.8	9.2	5.7	1.1	-	-	-
Costa	144.1	63.4	363.0	71.3	23.7	30.6	.0	32.3
El Oro	9.4	4.2	5.8	8.5	4.0	-	-	-
Esmeraldas	10.0	8.3	.9	5.7	9.3	-	-	.1
Guayas	101.6	28.4	285.5	29.3	9.6	14.0	-	-
Los Rios	4.6	1.7	12.7	8.2	.2	-	-	-
Manabí	18.7	20.8	58.1	19.6	.6	16.6	-	-
Oriente	24.0	12.0	9.4	11.9	3.7	.8	17.6	.2
Morona S.	1.4	2.7	2.9	.2	.9	.6	5.4	.2
Napo	12.4	1.6	1.5	7.5	.9	.1	-	-
Pastaza	5.5	2.0	2.2	4.2	1.4	.1	5.3	-
Zamora Ch.	4.9	5.7	3.0	-	.5	-	6.9	-
Galápagos	-	.2	.2	.0	.0	.0	.0	-

Source: Ecuador, Instituto Nacional de Estadística, 1974: Table 23, 1975: Table 25.

a) Vaccinations given in health establishments.
b) Includes revaccinations.
c) Includes either of three doses.
d) BCG is used against tuberculosis.

dose. However, when more than one dose is required, as is the case with DPT and Polio, the number of persons immunized would tend to be smaller than the total number of vaccinations given.

As can be observed in Tables 6a and 6b, the number of reported vaccinations had increased in most cases from the 1963-65 period to 1972-73. In the first three year period there are no data available on vaccinations against tetanus, yellow fever, and measles at the provincial level. Even in 1972-73 vaccinations against these diseases were relatively few and restricted to a few provinces of the coastal and eastern lowlands.

In the 1963-65 period the highest mean annual number of vaccinations (about 920 thousand) was against smallpox.* In contrast, in the 1972-73 period, the highest number of vaccinations (about 493 thousand) was for poliomielitis, with smallpox vaccinations occupying a second place (about 345 thousand).

In general, the data presented in Tables 6a and 6b indicate that in 1963-65 more immunizations were given in the highland region than in any of the other regions of the country. The coastal lowlands were usually in second place of priorities, while the Oriente and Galápagos received very little attention. The only exceptions to the above statements were vaccinations against typhus and whooping cough. In the first case, the Costa had more mean annual vaccinations than the Sierra (32.3 and 10.7 thousand respectively) and in the second case their total numbers were very similar (9.4 thousand for the Sierra and 8.9 for the Costa). Guayas and Pichincha appeared to receive the largest share of some vaccinations, particularly of smallpox, DPT, and polio.

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* Smallpox is a disease with no known cure and the best way to avoid its fatal affects is by vaccination. Traditionally, countries immunized as many of their inhabitants as possible; in the 1970's, several countries around the world started using a different approach in which vaccinations were given only in the immediate areas where a case or cases and their possible contacts were found.

As for the 1972-73 period, the Sierra's predominance in immunizations administered was restricted to smallpox and DPT. The Costa surpassed all other regions in number of polio, BCG, typhus, tetanus, and measles immunizations and the Oriente had practically all yellow fever doses given. Although there were some variations by type of vaccine administered, the tendency for Pichincha and Guayas to benefit with the largest amounts of vaccinations continued. Substantial numbers of vaccinations of most types were also given to Azuay, Chimborazo, and Manabí.

Curative Services

Most of the work of hospitals and clinics is geared to providing assistive and curative health services to people already afflicted with disease. Although health establishments such as health centers, health posts, and medical dispensaries carry on some important preventive functions such as immunizations and medical checkups, their main work is on the curative side as they serve ill people and either provide treatment or referrals to hospitals or clinics.

While the degree of a population's exposure to disease can be ascertained by the availability of preventive health services, i.e. sanitary works, immunizations, etc., the degree of a population's access to medical technology can be ascertained by the availability of curative health services, among them hospitals and clinics, health centers, number of beds, and medical personnel.

An illustration of the wide differences found in Latin America and the relative position of Ecuador is given in Figure 6, which presents

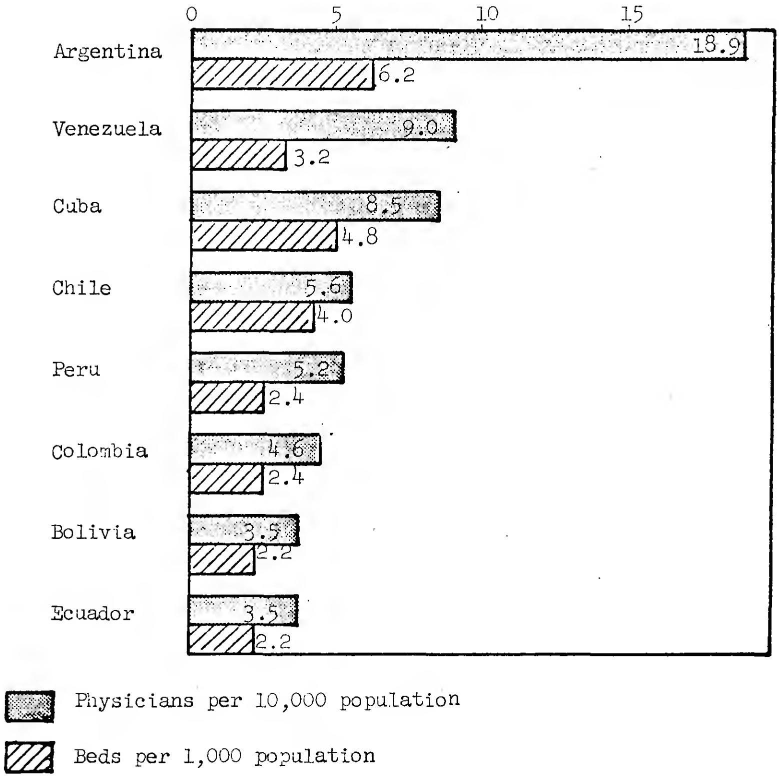

Figure 6. Physicians per 10,000 Population and Beds per 1,000 Population in Selected Latin American Countries, 1968

Source: PAHO, 1970: Figures 72 and 85.

bed/population and physician/population ratios for selected countries in 1968. In both cases, Argentina tops the list with over six beds per 1,000 population and about 19 physicians per 10,000 population. Several countries have between three and five beds per 1,000 population and between four and nine physicians per 10,000 population. Ecuador, along with Bolivia, occupies the bottom of the list with only about 2.2 beds per 1,000 population and 3.5 physicians per 10,000 population.

Hospitals, clinics, and health establishments

> Medical care provided in hospitals and in outpatient services consumes the greatest part of the health budget of most countries of the Americas. The demand for medical care varies with the health problems of the population as well as with its awareness of the needs and benefits of receiving medical attention. The level of demand is also influenced by the availability of resources of institutions and health personnel, their geographic distribution and the education and cultural characteristics of the population (PAHO, 1970:148).

The medical care facilities considered in this study are divided into two classes: first, hospitals and clinics, whose primary function is to provide medical care to hospitalized patients, and second, health establishments, i.e. health centers, health posts, medical dispensaries, ets. whose primary function is to provide medical care to out-patients with few or no in-patient services

Data referring to number of hospitals and clinics, their bed capacity in relation to the population, and a measure of their utilization are presented in Tables 7a and 7b. As observed, Ecuador increased the number of hospitals and clinics from 127 in 1965 to 221 in 1973. In the same approximate period, the number of beds per 1,000 population decreased from 2.3 to 2.0 while the number of hospital discharges per 1,000 popula-

Table 7a. Indicators of Accessibility to Medical and Health Care, by Province, Ecuador, c. 1965

Region Province	Hospitals and Clinics[a]	Health Establishments[b]	Hospital Beds	Beds per 1,000 Population	Hosp. Disch. Per 1,000 Population
	c. 1965				
NATION	127	222	12,034	2.3	39.1
Sierra	68	147			33.6
Azuay	9	7	681	2.3	31.0
Bolívar	1	7	190	1.2	15.6
Cañar	2	3	227	1.8	38.6
Carchi	4	13	197	1.9	26.5
Cotopaxi	7	5	291	1.4	25.8
Chimborazo	6	9	459	1.4	24.1
Imbabura	4	10	289	1.5	36.6
Loja	4	10	298	.9	15.4
Pichincha	23	80	3,097	4.5	56.4
Tungurahua	8	3	520	2.2	25.2
Costa	51	65			45.0
EL Oro	9	10	426	2.3	50.6
Esmeraldas	3	3	150	1.1	20.1
Guayas	28	36	4,215	3.8	63.3
Los Rios	4	4	322	1.1	29.4
Manabí	7	12	537	.8	25.1
Oriente	8	7			41.2
Morona S.	2	0	58	1.9	41.8
Napo	3	1	30	1.0	54.9
Pastaza	3	0	47	2.8	50.6
Zamora Ch.	0	6	0	.0	.0
Galápagos	0	3	0	.0	.0

Source: Compiled and computed by the author from data in INE, 1972b: Table 2; JNPC, 1968:24.

a) Estimated for about 1962; includes 12 hospitals and clinics whose starting date of operation was not reported.

b) Includes 46 health establishments whose starting date of operation was not reported.

Table 7b. Indicators of Accessibility to Medical and Health Care, by Province, Ecuador, c. 1973

	c. 1973				
Region Province	Hospitals and Clinics	Health Establish-ments	Hospital Beds	Beds per 1,000 Population	Hosp. Disch. Per 1,000 Population[a]
NATION	221	602	13,594	2.0	42.9
Sierra	114	380	6,804		39.9
Azuay	12	17	714	2.2	46.3
Bolívar	1	14	170	.9	14.9
Cañar	2	18	187	.5	39.7
Carchi	4	11	177	1.4	22.8
Cotopaxi	9	22	285	1.2	26.5
Chimborazo	10	35	544	1.4	28.2
Imbabura	5	32	306	1.4	37.6
Loja	11	38	434	1.1	21.2
Pichincha	47	70	3,503	3.8	61.3
Tungurahua	13	23	474	1.8	44.9
Costa	92	205	6,283		44.5
El Oro	14	17	461	1.7	40.8
Esmeraldas	7	13	206	1.1	28.8
Guayas	52	88	4,574	2.9	59.1
Los Rios	6	9	244	.6	22.5
Manabí	13	78	796	.9	33.4
Oriente	13	17	464		75.0
Morona S.	4	1	103	2.3	45.1
Napo	5	2	201	4.7	101.3
Pastaza	3	1	88	3.5	109.9
Zamora Ch.	1	13	72	3.6	54.7
Galápagos	2	0	43	10.7	96.6

Source: Compiled and computed by the author from data in INE, 1975b: Table 4.

a) 1972 data.

tion increased from about 39 to 43.* The decrease in bed/population ratio, despite a greater number of hospitals and clinics, means basically, that the country has not even been able to match the increase in number of beds to population growth during the period considered, much less to improve the bed/population ratio.

Regarding health establishments, Tables 7a and 7b indicate that Ecuador increased their number almost three-fold, from 222 in 1965 to 602 in 1973. Around 1965, the Sierra had more hospitals and clinics, health establishments, and hospital beds than either of the other regions of Ecuador. Both the Costa and Oriente, however, surpassed the Sierra in number of hospital discharges per 1,000 population.

The ratio of beds per 1,000 inhabitants is a very important measure of the availability of medical care services in an area for it avoids the problems inherent in simpler measures such as number of hospitals and clinics or number of hospital beds. In the first case, the fact that one province has only one hospital or clinic and another has four or seven does not mean much unless more is known about the bed capacity and, in general, the quality and quantity of both material and human resources. Second, the number of hospital beds alone is not adequate because any meaningful comparison among provinces must take into consideration their population also.

Across the nation, the number of hospital beds per 1,000 population in 1965 was very low. Some provinces such as Zamora Chinchipe, and Galápagos did not have hospital beds at all! Most other provinces fluctuated between one and two beds per 1,000 population. The highest ratios belonged to Pichincha (4.5), Guayas (3.8), and Pastaza (2.8).

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* According to the Pan American Health Organization (PAHO, 1970: 153) hospital discharges for 1,000 population would probably have to be at least 100 to meet the need for medical attention in countries of Latin America.

Around 1973, the Sierra still had more hospitals and clinics, health establishments, and hospital beds than the other regions of the country. In terms of hospital discharges per 1,000 population, the Sierra had the lowest ratio (39.9), followed by the Costa (44.5), the Oriente (75.0), and Galápagos (96.6). The 1973 ratio of beds per 1,000 population (2.0) was smaller than that of 1965 (2.3). The building of hospitals and clinics during the period had not been able to keep up with the growth of Ecuador's population and, contrary to expectations, the situation worsened. There were, nevertheless, some positive aspects in 1973. First, some provinces which had no hospital beds nine years earlier in 1973 had among the highest bed/population ratios of the nation. Galápagos had 10.7, Zamora Chinchipe, 3.6, and Napo, 4.7. Second, the greatest reductions in the bed/population ratio occurred in Pichincha and Guayas and this meant that during the 1965-73 period there had been a tendency to distribute resources more evenly among all provinces, instead of the usual preference for these two provinces.

Human Health Resources

A key element in the provision of medical and health care service to the population is the availability of well-trained personnel, sufficient in number and adequately distributed around a nation. Health personnel consists not only of professional, technical, and administrative staff but also of auxiliary workers. In addition to the large number of doctors, nurses, and dentists required to staff hospitals and other health units, health work depends on the active participation of auxiliary workers and paramedical personnel, including sanitary engineers, veterinarians, health educators, x-ray technicians, nutritionists, and so on (PAHO, 1970).

Public health systems have such complexity that adequate country to country comparisons cannot be made. Yet for illustrative purposes it is worth making comparisons of personnel indicators such as physicians per population. As observed in Figure 6, Latin American countries exhibit wide differences in regards to physician/population ratios. While Argentina in 1968 had about 19 physicians per 10,000 inhabitants, several other countries had from four to nine, and Ecuador was at the bottom of the list with only 3.5.

Of the 14,892 health personnel working in either hospitals, clinics, health centers, or other health establishments of Ecuador in 1972 (Table 8), about 83 percent did so full time and the rest (17 percent) only worked part-time. Physicians made up over 16 percent of all health personnel while other professionals such as dentists, obstetricians, nurses, made up over ten percent and student interns three percent. The largest numbers were among auxiliary, administrative, and clerical and service workers. Professional personnel not only represented less than 30 percent of total health staff but also a good proportion of them worked only part-time in health establishments: only 23 percent of all physicians and 70 percent of other professionals worked full time in health establishments.

Regional and provincial comparisons of human resources available in the field of health are restricted to number of physicians per population ratios at two points in time. Other comparisons are not possible due to lack of data disaggregated by province for the early 1960's.

At the national level there were about 1,000 more physicians in 1972 than in 1962 (see Table 9). The ratio of physicians per 10,000 in-

Table 8. Health Personnel working either Full or Part Time in Health Establishments, by Occupation, Ecuador, 1972

Type of Occupation	Total	Percent	Percent working in health establishments	
			Full time	Part time
All Types	14,892	100.0	82.8	17.2
Physicians	2,427	16.3	23.2	76.7
Other Professionals[a]	1,547	10.4	70.3	29.7
Student Interns	472	3.2	66.9	33 1
Technical Services, Auxiliaries	5,753	38.6	99.4	.6
Administration and Clerical	1,328	8.9	98.3	1.7
Service Personnel and other[b]	3,365	22.6	99.4	.6

Source: INE, 1975b: Table 12.

a) Includes dentists, obstetricians, nurses, nutritionists, engineers, etc.

b) Includes occupations from kitchen personnel to drivers and porters.

Table 9. Number of Physicians and Physicians per 10,000 Population, by Province, Ecuador, 1962 and 1972

Region Province	Physicians Number 1962	 1972	 Per 10,000 Population 1962[a]	 1972
NATION	1,279	2,292	2.7	3.5
Sierra	696	1,289	2.9	2.7
Azuay	64	106	2.3	3.3
Bolívar	12	24	.8	1.3
Cañar	13	24	1.1	1.7
Carchi	19	22	1.9	1.8
Cotopaxi	21	43	1.0	1.7
Chimborazo	60	61	2.0	1.5
Imbabura	43	54	2.4	2.4
Loja	30	45	1.0	1.1
Pichincha	396	843	6.5	9.2
Tunguahua	38	76	1.7	2.8
Costa	568	972	2.7	2.1
El Oro	34	48	2.1	1.8
Esmeraldas	11	24	.9	1.3
Guayas	451	742	4.5	4.9
Los Rios	19	43	.7	1.1
Manabí	53	115	2.5	1.3
Oriente	15	27	1.9	2.3
Morona S.	5	6	2.0	1.4
Napo	4	8	1.6	1.9
Pastaza	5	9	3.6	3.9
Zamora Ch.	1	4	.8	2.0
Galápagos	0	4	.0	10.0

Source: Favin, 1973:216; DEC, 1964; INE, 1974c.

a) Calculated by the author.

habitants increased from 2.7 at the earlier date to 3.5 at the later one. At the two points in time there were more doctors in the Sierra than either in the Costa or in the other two regions. Both in 1962 and 1972 Pichincha and Guayas had more physicians than all the other provinces combined. In 1962, Pichincha had 6.5 physicians per 10,000 population and was at the top of the list. Guayas followed with 4.5; seven other provinces had between two and four, and the rest, less than two. In 1972, the province of Galápagos had the highest physician per population ratio (10.0);* Pichincha followed with 9.2. Six provinces had between two and five and the rest, less than two.

Because of the very small doctor per population ratios in the majority of Ecuadorian provinces one can safely state that they have substantial shortages in health personnel, yet what a PAHO report states in regards to countries should also be applicable to their subdivisions. It says:

> No single ratio can express the adequacy of number of available physicians. The number needed varies with the structure of the medical care system, . . .health problems and . . .demand for services (PAHO, 1966:120).

Differential Distribution

Urban-rural differences

A comparison of urban-rural differences in the provision of public health services is essential because it contributes to the knowledge of whether or not public health policy is made to serve equally the needs of all inhabitants regardless of place of residence. It has been found that Pichincha and Guayas are the provinces with the greatest concentration of preventive and curative services as well as those human health resources for which data are available. Their inhabitants are therefore better cared for than those of the rest of the provinces in the country. If we consider also the fact that both in 1962 and in 1974 a large proportion of the population of these two provinces was urban (about 64 and 59 percent respectively), then it is apparent that, in Ecuador, priority in the distribution of public health resources and services has been given to predominantly urban provinces.

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* Note that as indicated in Table 1, Galápagos in 1974 had only about 4,000 inhabitants. A ratio of ten physicians per 10,000 population would indicate that there were about four doctors on the islands, or about one doctor per 1,000 population.

Except for proportion of small health establishments (see Table 10) there are great contrasts regarding the urban-rural distribution of selected health indicators. Around 1962, areas defined as urban had 36 percent of the total population and areas defined as rural had 64 percent of the total population; about 68 percent of all health centers, health posts, and other health establishments were in urban areas while 32 percent were in rural ones. Urban areas had almost all the hospitals and clinics, hospital beds, and doctors; about 87 and 79 percent of urban dwellings had piped water supply and sewerage systems respectively in contrast to only about 12 and nine percent of rural dwellings with such services in the same order.

Around 1974, the urban-rural proportions changed with respect to 1962 and the distribution of selected health indicators was slightly less biased against rural areas. Urban areas in 1974 had about 41 percent of the total population and rural areas had close to 59 percent; 48.7 percent of all health establishments were in urban areas while 51.3 were in rural ones; as before, urban areas had the large majority (well over 90 percent)

Table 10. Total Number and Percent Distribution of Population and Selected Health Indicators, Urban and Rural Areas, Ecuador, c. 1960 and c. 1974

Indicator	c. 1962 National Total	 Urban Percent[a]	 Rural Percent[b]	c. 1974 National Total	 Urban Percent	 Rural Percent
Population (1962, 1974)	4,476,007	36.0	64.0	6,552,046	41.3	58.7
Health Centers and other Health Establishments, 1968, 1973	382	67.8	32.2	602	48.7	51.3
Hospitals & Clinics, 1960, 1973	127	almost all urban		221	99.5	0.5
Hospital Beds (1964, 1973)	11,776	almost all urban		13,594	95.8	4.2
Doctors (1965, 1971)	2,075	94.2	5.8	12,946	93.4	6.6
Piped Water[c] (1962, 1974)	(37.5)	87.2	12.0	(41.8)	83.1	13.4
Seweraged[d] (1962, 1974)	(30.8)	79.4	9.0	(40.4)	83.3	11.0

Source: Compiled and computed by the author from data in DEC, 1964; INE, 1971-75b; OCN, 1975; Favin, 1973.

a) Population of cities, provincial capitals, and canton seats.
b) Population of parish seats and other areas not qualifying as urban.
c) Percent of dwellings (*viviendas*) either having house connections or with easy access.
d) Data for 1962 refer to toilet facilities both for private dwellings and common use connected to public sewage disposal systems as well as dwellings with latrines and septic tanks.

of all hospitals and clinics, hospital beds and doctors. Out of the 573 dentists counted in 1968, over 93 percent resided and probably worked in urban areas, in contrast to less than seven percent in rural areas. Regarding piped water and sewerage systems, urban areas in 1974 had about 83 percent of their dwellings with both services while rural areas had only about 13 percent of their dwellings with piped water and 11 percent with sewerage systems.

The above findings indicate clearly that 1) the rural population is more exposed to disease than its urban counterpart because it practically lacks piped water supply and sewerage systems, and 2) the rural population's access to medical technology is practically nil as most specialized medical services, i.e. hospitals and clinics, physicians and dentists, are concentrated in urban areas.

Social class differences

The analysis of the differential distribution of health services in terms of how it affects various social classes in Ecuador is of necessity only brief and tentative. The basic questions addressed are who owns or controls most medical care facilities in the country and, what social classes or social groups have access to those facilities and their services?

Social class is a term used here very loosely, and does not correspond either to the Marxist definition which involves position in regard to ownership of the means of production or to common American interpretations of the term as involving occupation, education, and income factors. In general, social class is used almost as a synonym for broad occupational groups.

As observed in Table 11, out of the total of 823 medical care facili-

Table 11. Medical Care Facilities by Class and Institutions to which they belong, Ecuador, 1973

Institutions	Total Facilities	Hospitals & Clinics	Health Establishments (Centers, Dispensaries, etc.)
Total Nation	823	221	602
Public Sector	702	109	593
Min. Public Health[a]	431	84	347[c]
IESS	145	12	133[d]
Municipalities of Police	37	2	35
Armed Forces	11	6	5
Welfare Board of Guayaquil	6	5	1
Other[b]	72	-	72
Private Sector	121	112	9

Source: INE, 1975b: Table 5.

a) Includes facilities of ex-LEA and SOLCA.

b) Includes facilities of Agriculture Ministry, Red Cross, and Ministry of Government.

c) Includes 17 Municipal Medical dispensaries of canton Quito, which are integrated into Health Subcenters.

d) Includes 101 medical dispensaries which are IESS surrogate facilities.

ties reported in 1973, 702 or about 85 percent belonged to the public sector while 15 percent did to the private sector. The public sector had a smaller number of hospitals and clinics than did the private sector (109 as compared to 112) but had almost all the health establishments in the nation (593 out of 602).

With the exception of 19 hospitals and clinics run by religious groups or charitable organizations, most of these private facilities are profit-making institutions and therefore access to them is restricted to those who can afford to pay their prices. In other words, access to private hospitals and clinics is restricted almost exclusively to urban upper and middle class groups.

Some of the public sector facilities have also a limited clientele. The 12 hospitals and 133 health establishments of the Social Security Institute, IESS, are only for the utilization by the approximately six percent of the total population who are affiliated with the institution and a restricted number of their immediate family. Most IESS membership is made up of urban white collar and skilled blue collar workers. A large proportion of the urban working class, from skilled workers (such as carpenters, shoemakers, and painters) to people engaged in menial work, domestic service, and street vending do not belong to the IESS and cannot benefit from the services of its medical facilities. Only in the last few years have efforts been made to incorporate large occupational groups such as domestic service workers under the Social Security; success has so far been very limited.

Recent attempts to bring peasant farmers into the social security system have been even less successful and for all practical purposes, it can be stated that the rural population, which represents over half the national total, is not significantly represented in the IESS.

The medical care facilities belonging to the Armed Forces and Police are obviously also restricted to their members who probably do not represent even two percent of the total population of Ecuador.

What is left of the public sector, i.e. the medical care facilities of the Ministry of Health (which now includes the facilities of the ex-social assistance boards, the ex-Ecuadorian Antituberculosis League, etc.), those of the Welfare Board of Guayaquil, and a few others are supposed to serve the health needs of all the rest of the population that is not covered by the other institutions previously mentioned. The matter becomes more complicated when one considers that the Welfare Board of Guayaquil works almost exclusively in the Province of Guayas.

Roughly speaking then, the medical care facilities of the Ministry of Public Health (84 hospitals and clinics and 347 health establishments) are expected to be available to large proportions of the urban population as well as to almost all the rural population.

In actual practice, public health services are not really accessible to rural inhabitants, excepting those who have some resources to make the trip to the city and/or can be assisted by contacts in the urban areas. Time, distance, and cultural barriers further conspire against people from the countryside so that it is not infrequent to find that they arrive at some urban health center or at a hospital only to die because their disease or other health problem is already in the advanced stage.

The maldistribution of health care services prevails in Ecuador because, as mentioned previously, national governments have tended to favor investment in urban rather than in rural areas. Urban populations have been given priority for the provision of many basic public services --

including potable water, sewerage systems, and hospital care -- not only because they are concentrated in a way that facilitates their servicing but also because they have usually been able to articulate their demands and to exert effective pressure on the national government. Since the oligarchy or ruling elite of Ecuador is mostly urban oriented, it has procured the development of urban areas at the expense of the rural ones. And, although the large majority of the people residing in urban areas are not to be considered as part of the national elite, it is obvious that it has benefitted from the official discrimination against the peasantry, albeit in a limited way. Finally, paraphrasing Navarro (1974:14) it can be stated that the maldistribution of health services follows and parallels the distribution of most of the resources of the nation: as the patterns of production and consumption in the overall economy are determined by particular, mostly urban based, social classes, so are the patterns of production and consumption in the health sector.

CHAPTER V
MORTALITY CONDITIONS

After a brief comparison of mortality between Latin America and other areas of the world, this chapter studies mortality conditions in Ecuador using the crude death rate and the infant mortality rate. Then it analyzes mortality differences according to age, sex, and residence. Finally, it deals briefly with the main causes of death in the country.

Latin America and Other Areas Compared

According to the United Nations Demographic Yearbook for 1970, the death rate for Latin America as a whole is very similar to those of the most industrially developed areas of the world by contrast to those of other developing areas. For instance, as shown in Table 12, in the 1965 to 1970 period, Latin America had a death rate of ten per thousand which was similar to Europe's (ten) and slightly higher than North America's (nine). Meanwhile, Africa and South Asia had very high rates of 20 and 16 per thousand respectively.

This is the result of a substantial decrease of mortality in Latin America. Although data for the beginning of the century are hardly reliable, it seems that the Latin American countries had high mortality rates, ranging from 25 to 30 per 1,000. In some countries mortality rates might have declined over 50 percent from 1900 to 1960 (Miró, 1966:68).

Although Latin America, like Asia and Africa, has a high birth rate of about 40 per thousand, its death rate is two-thirds as high as that of Asia and half that of Africa. This unique combination makes the popu-

Table 12. Crude Death Rates of Major World Areas, 1965-1970

World Area	Crude Death Rate[a]
World Total	14
Africa	20
Northern America	9
Latin America	10
East Asia	13
South Asia	16
Europe	10
Oceania	10
U.S.S.R.	8

Source: United Nations (UN), Statistical Office, 1971:105.

a) $\frac{\text{Deaths}}{\text{Population}} \times 1{,}000.$

lation of Latin America the fastest growing in the world. The low death rate of the Latin American continent does not preclude the fact that some countries still have extremely high death rates. As illustrated in Figure 7, Venezuela, during the period 1965 to 1970 reported a death rate of only about eight per thousand, while Bolivia during the same period reported a death rate of 19 per thousand.

With regard to other indexes of mortality, while in North America only seven percent of deaths occur among children under five years of age, the figure for Latin America is 42 percent, varying from 13 to 58 percent (Horwitz and Burke, 1966:154). On the other hand, according to Somoza (1971:490), the estimated level of mortality expressed as the expectation of life at birth is 57.61 years in Latin America. However, this measure ranges from 41 to 43 years for males and females respectively in Haiti to 65 and 71 in Uruguay.

Differential Mortality in Ecuador

Provincial Differences

Crude death rates

The crude death rate, or general death rate, is a ratio of the total number of deaths during a year to the total mid-year population, multiplied by 1,000.

There has been a rapid decline of the death rate in Ecuador during the last 50 years. From an estimated 28.1 per thousand in 1925 it declined to 17.3 in 1950 (Merlo, 1969:17) and to 9.9 in 1974 (DNP, 1976:15). The 1925 figure thus has been reduced by about two thirds. This sharp decline, however, has not affected the different regions of the country equally. Ecuador's death rates for 1964 and 1974 (see Table 13) show

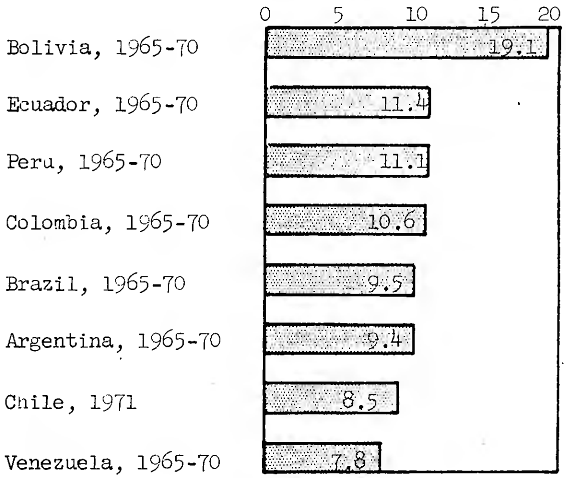

Figure 7. Reported Crude Death Rates for Selected Latin American Countries, 1965-1970

Source: Elaborated by the author from data in UN, 1976:80-81.

Table 13. Reported Death Rates, Absolute and Percent Change, by Provinces, Ecuador, 1964 to 1974

Region Province	Death Rates 1964	 1974	Change Absolute	 Percent
NATION	11.5	9.9	1.6	-14
Sierra				
Azuay	15.1	12.6	-2.5	-17
Bolívar	12.3	14.0	1.7	14
Cañar	15.3	12.3	-3.0	-20
Carchi	15.1	10.5	-4.6	-30
Cotopaxi	19.1	20.0	.9	10
Chimborazo	18.0	17.3	- .7	- 4
Imbabura	19.2	16.8	-2.4	-13
Loja	8.1	7.8	- .3	- 4
Pichincha	11.4	9.0	-2.4	-21
Tungurahua	17.4	15.1	-2.3	-13
Costa				
El Oro	9.5	6.1	-3.4	-36
Esmeraldas	8.5	7.8	- .7	- 8
Guayas	10.2	7.6	-2.6	-25
Los Rios	12.5	7.5	-5.0	-40
Manabí	8.0	6.7	-1.3	-16
Oriente				
Morona S.	13.6	8.3	-5.3	-39
Napo	5.7	5.6	- .1	- 2
Pastaza	10.7	7.2	-3.5	-33
Zamora Ch.	13.7	10.0	-3.7	-27
Galápagos	3.1	3.7	- .6	19

Source: INE, 1965:74; DNP, 1976:23.

broad differences among the various provinces. Thus, for instance, in 1964, while Galápagos had a death rate of only 3.1 per thousand, Imbabura and Cotopaxi had rates of over 19 per thousand. Similarly, in 1974, all the provinces of the Costa and Oriente had death rates below ten per thousand while the Sierra provinces, with the exception of Pichincha and Loja, had death rates ranging from 10.5 to as high as 20.0 per thousand.

Even though the data in Table 13 should not be seen as reliable in all cases,* the following points should be noticed: 1) In ten years, the absolute change in the crude death rate of Ecuador was equal to 1.6; this is equivalent to a 14 percent decline. The mortality rates of the Costa's provinces declined more rapidly than those of the Sierra's. 2) The highest decline in the Costa occurred in the province of Los Rios; from 1964 to 1974, its death rate decreased by about 40 percent. The highest decline in the Sierra on the other hand, occurred in Pichincha and Carchi, which had 21 and 30 percent decreases respectively.

Infant Mortality Rate

The crude death rate is relatively easy to compute and it is helpful for comparative purposes; however, it is not a satisfactory index of mortality as it does not account for some important differentials, mainly age and sex. The use of crude death rates for comparative purposes in certain cases can be very misleading, as the following paragraph illustrates:

> If we examine crude death rates (number of deaths per thousand population) some overall mortality convergence may be observed by the late 1960's. Countries with very

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* According to Saunders (1961:57), "It is likely that the most accurate as well as the lowest death rates in Ecuador are those for the provinces of Pichincha, which contains the capital city, and Guayas, location of Guayaquil."

> different levels of economic development had very low crude death rates. For example, among the forty countries with crude death rates of 10 per 1,000 or less in the late 1960's are the United States, Canada, Japan, Chile, Mexico, Barbados, South Yemen, and others. But among those countries with low crude death rates, six had infant mortality rates over 70 per 1,000 live births while nine had infant mortality rates below 20 (Goldscheider, 1971:118).

The infant mortality rate has been given a great deal of attention, largely due to the eloquence with which the uselessness of lives lost appears. Thus, the infant mortality rate can be regarded as an indirect measure of the levels of health and of socio-economic conditions in a nation. Moreover, in contrast to crude death rates, it seems that only countries which have achieved a combination of better health and improved socio-economic conditions have been able to reduce infant mortality rates. This idea is best illustrated in the expression: "Civilizations are mirrored in their causes of death" (Davis, 1970:430). Most of the developing countries have high rates of infant mortality. For instance, in the late 1960's the Andean countries had infant mortality rates ranging from 50 per thousand (Colombia, 1966) to 108 per thousand (Bolivia, 1970) while the corresponding rate for the United States was only 24.7 (1965).

The infant mortality rate is computed by dividing the number of registered deaths of children under one year of age by the number of registered births, multiplied by a constant (1,000).

In the 1960's over 30 percent of all reported deaths in Ecuador occurred among children under one year of age. In 1967, for instance, the percentage was 33.3 (OEA, IIE, 1970:147). This proportion is not reached at any other age and could be even higher because deaths of infants are underreported to a greater extent than those of older persons (DNP, 1974: 1, 2).

The infant mortality rate in Ecuador has declined from an estimated 110 per thousand annually during the 1954-1956 period to approximately 70 in the year 1974 (JNPC, 1971:32; DNP, 1976:26). With the precautionary note that the data for some provinces are unreliable because of probable underregistration of births and deaths of infants, a breakdown of the infant mortality rates and their change by various subdivisions of the country is presented in Table 14. In 1965, the provinces with the most complete registration of deaths, Pichincha and Guayas, had infant mortality rates of 93.3 and 100.9 respectively. If one considers the additional fact that Pichincha, Guayas, and Galápagos have better health services than the rest of the nation then one could logically expect higher rates of infant mortality in all the rest of the provinces, and consequently in the nation as a whole.

However, the data in Table 14 do not indicate so. Instead, there are a few provinces with very low figures, such as Loja with 54.2, Manabí, 62.9, and Mapo, 28.6. Because of the underregistration that these figures probably represent, the infant mortality rate for the nation as a whole appears below that of Pichincha and Guayas. The data for 1974 are more consistent and probably more accurate than that for the earlier year. However, there are still relatively low rates of infant mortality that can be explained only by underregistration, for example, those of Loja (45.4) and Napo (43.3).

In 1974, the provinces of Pichincha and Guayas had infant mortality rates of 75.0 and 71.5 respectively. Interestingly, the highland provinces bordering Pichincha on the North and South, Imbabura and Cotopaxi, had two of the highest registered infant mortality rates of the country, 100.4 and 122.0 respectively. The figures representing absolute change in the

Table 14. Reported Infant Mortality Rates, Absolute and Percent Change, by Provinces, Ecuador, 1965 to 1974

Region	Rates of Infant Mortality		Change	
Province	1965	1974	Absolute	Percent
NATION	93.0	70.2	-22.8	-25
Sierra				
Azuay	90.6	84.5	- 6.1	- 7
Bolívar	94.0	71.6	-22.4	-24
Cañar	80.2	64.4	-15.8	-20
Carchi	115.6	98.7	-16.9	-15
Cotopaxi	136.6	122.0	-14.6	-11
Chimborazo	124.3	105.7	-18.6	-15
Imbabura	132.9	100.4	-32.5	-24
Loja	54.2	45.4	- 8.8	-16
Pichincha	93.3	75.0	-18.3	-20
Tungurahua	130.5	98.4	-32.1	-25
Costa				
El Oro	65.0	45.5	-19.5	-30
Esmeraldas	80.4	76.4	- 4.0	- 5
Guayas	100.9	71.5	-29.4	-29
Los Rios	101.3	54.3	-47.0	-46
Manabí	62.9	38.4	-24.5	-39
Oriente				
Morona S.	76.1	60.8	-15.3	-20
Napo	28.6	43.3	14.7	51
Pastaza	70.8	59.6	-11.2	-16
Zamora Ch.	83.4	72.5	-10.9	-13
Galápagos	37.0	65.2	28.2	69

Source: OAS, IIE, 1970:108; DNP, 1976:25.

infant mortality rates are extremely varied. They range from an increase of 28.2 for Galápagos, which should be interpreted partly as an improvement of registration rather than only as an increase in actual deaths, to the fairly high 32.5 decline for Imbabura. In very rough terms, the data in Table 14 show that, from 1965 to 1974, the Costa experienced a greater decline in infant mortality than the Sierra. This assertion is strengthened by the fact that Guayas (the largest province on the Costa) had an absolute reduction of 29.4 while Pichincha (the largest province in the Sierra) had a corresponding decrease of only 18.3 per thousand. The decline in the infant mortality rate for the whole nation, measured as relative change, was greater than the decline of the crude death rate. While there was a 25 percent reduction in the infant mortality rate in nine years, there was a 14 percent reduction in the crude death rate in ten years.

The fact that Pichincha and Guayas (provinces which rank high in terms of public health services per population), in 1965 and 1974, had infant mortality rates above those of the nation as a whole needs further explanation. It is likely that, as previously suggested, the infant mortality rates of these two provinces reflect fairly accurate statistics and that, in contrast, the data for the rest of the nation are affected by underregistration of infant deaths; therefore, the infant mortality rates for the nation as a whole should be higher than reported. But, in addition, there are two other possible explanations. First, Pichincha and Guayas may be registering not only the deaths of infants belonging to their resident populations but also those of infants whose parents reside in other areas of the nation yet bring their offspring to receive medical and health care -- and so often to die -- in these two provinces. Second, the infant mortality rates of Pichincha and Guayas may actually be higher than those of the nation as a whole because, although they have more and better medical and health care services, the majority of their populations have only a very limited access to them. As noted in the previous chapter, most public health services are located in urban areas. Moreover, a significant proportion of all health care facilities, such as those belonging to the IESS and the Armed Forces and Police, provide services only to their members.

Age Specific Death Rates

Since crude death rates do not take into account the age structure of the population and its effect upon mortality, and the infant mortality rate deals with different kinds of data, namely deaths of children under age one per thousand live births, Table 15 has been constructed in order to contrast two populations with fairly similar crude rates but different age structures. It shows the distribution of deaths by age in Ecuador, and at the same time, compares it with the corresponding distribution of a more developed country, the United States.

In the first place, it is significant to note that in Ecuador the age specific death rates corresponding to children under five are almost three times as high (30.9 per thousand) as the rate for all ages (10.8). Moreover, with the exception of the age groups above 59, the death rates after age five drop substantially, and remain relatively low ranging from 1.4 per thousand for persons aged ten to 19 to 9.3 for those aged 50 to 59. The lowest death rate occurs in the ten to 19 age group.

More than half (54 percent) of the deaths in Ecuador occur among the population under five years of age. The number of deaths among children zero years old represents 31 percent of all deaths occuring in the country and 58 percent of the deaths occurring in the age group zero to four. After

Table 15. Age Specific Death Rates, and Percent of Total Deaths, Ecuador and the United States, 1968[a]

Age Group	Death Rates		Percent of Total Deaths	
	Ecuador	U.S.	Ecuador	U.S.
All Ages	10.8[b]	9.6	100.0	100.0
0	86.1	22.3	31.5	3.9
0 - 4	30.9	4.8	54.1	4.6
1 - 4	16.4	.1	22.6	.7
5 - 9	2.7	.0	3.9	.5
10 - 19	1.4	.1	3.2	1.5
20 - 29	2.8	.1	3.9	2.0
30 - 39	4.1	.2	4.0	2.4
40 - 49	5.7	.5	3.8	6.1
50 - 59	9.3	1.1	4.2	12.2
60 - 69	25.7	2.6	6.2	20.0
70-	84.7	7.9	15.1	50.8

Source: Compiled and computed from data in UN, Statistical Office, 1971:250-251, 258-259, 674-675.

a) Based on population estimates and registered deaths.

b) The age standardized death rate for Ecuador using the United States population as the standard population is 13.0 or 35 percent greater than that of the United States (9.6).

the first five years of life there is no age group reaching the same proportion. Thus, the percentage of deaths occurring among the age groups from five to 69 ranges from 3.2 (ten-19) to 6.2 (60-69). The rather high percentage of deaths occurring among the population aged 70 and over is partly explained by the large interval of age in this category. On the other hand, it is completely normal to find patterns of high mortality among the aged peoples of all countries.

When all ages are considered, the death rates of the populations of Ecuador and the United States do not differ greatly. However, their age specific death rates offer very sharp contrasts Thus, the age specific death rates of Ecuador, without exception, are higher than their counterparts in the United States. What is even more outstanding in the comparison between these two countries is the proportional distribution of deaths in the various age groups. Deaths of children age zero represent 31.4 percent of all deaths in Ecuador; in contrast, they represent only 3.9 percent in the United States. More than half of all deaths in Ecuador occur among people under five years of age; in contrast, a similar proportion of deaths in the United States occurs among people over 70 years of age.

Expectation of life: The life table

Departing from the knowledge of age specific death rates, the expectations of life at different ages can be calculated using life table techniques. The life table is defined as the "life history of a hypothetical group, or cohort, of people, as it is diminished gradually by deaths" (Barclay, 1970:93).

The most recent life tables of the population of Ecuador by sex are shown in Tables 16 and 17 below. In 1974, the expectations of life, given by the e_x column, was higher for females in all age groups than for males.

Table 16. Abridged Life Table for Males, Ecuador, 1974

Age	Probability of Dying Between Age x and age x - n	Survivors at Exact Age x	Number of Deaths Between Age x and Age x - n	Years Lived Between Age x and Age x - n	Total Years Lived After Exact Age x	Expectation of Life. Average Number of Years Lived After Exact Age x
x-(x=n)	$_nq_x$	l_n	$_nd_x$	L_x	T_x	$\overset{0}{e}_x$
0	0.07428	100.000	7.428	94.475	5'951.096	59.5
1 - 4	0.03779	92.573	3.498	361.299	5'856.621	63.3
5 - 9	0.01188	89.075	1.058	442.730	5'495.322	61.7
10 - 14	0.01028	88.018	905	437.824	5'052.592	57.4
15 - 19	0.01323	87.113	1.153	432.681	4'614.769	53.0
20 - 24	0.01909	85.960	1.614	425.699	4'182.089	48.6
25 - 29	0.02017	84.320	1.701	417.346	3'756.393	44.5
30 - 34	0.02180	82.619	1.802	408.591	3'339.047	40.4
35 - 39	0.02492	80.818	2.014	399.055	2'930.457	36.2
40 - 44	0.03046	78.805	2.401	388.021	2'531.403	32.1
45 - 49	0.03784	76.405	2.892	374.794	2'143.382	28.0
50 - 54	0.05121	73.514	3.765	358.156	1'768.590	24.0
55 - 59	0.06844	69.750	4.774	336.812	1.410.435	20.2
60 - 64	0.10096	64.976	6.560	308.480	1'073.623	16.5
65 - 69	0.15322	58.417	8.951	269.705	765.143	13.1
70 - 74	0.23976	49.466	11.860	217.680	495.439	10.0
75 - 79	0.36658	37.606	13.786	153.566	277.760	7.4
80 +	1.00000	23.821	23.821	124.194	124.194	5.2

Source: DNP, 1976:38.

Table 17. Abridged Life Table for Females, Ecuador, 1974

Age x-(x= n)	Probability of Dying Between Age x and Age x - n $_nq_x$	Survivors at Exact Age x l_n	Number of Deaths Between Age x and Age x - n $_nd_x$	Years lived Between Age x and Age x - n L_x	Total Years Lived After Exact Age x T_x	Expectation of Life. Average No. of Years Lived After Exact Age x e_x^0
0	0.06869	100.000	6.868	94.891	6'182.686	61.8
1 - 4	0.03336	93.132	3.107	364.488	6'087.796	65.4
5 - 9	0.01040	90.026	936	447.787	5'723.308	63.6
10 - 14	0.00898	89.090	800	443.450	5'275.520	59.2
15 - 19	0.01153	88.291	1.018	438.908	4'832.074	54.7
20 - 24	0.01660	87.273	1.449	432.744	4'393.167	50.3
25 - 29	0.01749	85.825	1.502	425.371	3'960.423	46.1
30 - 34	0.01887	84.324	1.591	417.641	3'535.056	41.9
35 - 39	0.02153	82.733	1.782	409.211	3'117.415	37.7
40 - 44	0.02629	80.952	2.129	399.438	2'708.205	33.4
45 - 49	0.03265	78.824	2.573	387.685	2'308.768	29.3
50 - 54	0.04419	76.251	3.370	372.829	1'921.083	25.2
55 - 59	0.05916	72.882	4.312	353.628	1'548.256	21.2
60 - 64	0.08766	68.570	6.011	327.823	1'194.629	17.4
65 - 69	0.13423	62.560	8.398	291.803	866.806	13.8
70 - 74	0.21351	54.162	11.564	241.901	575.004	10.6
75 - 79	0.33473	42.599	14.259	177.344	333.103	7.8
80 +	1.00000	28.340	28.340	155.760	155.760	5.5

Source: DNP, 1976:39.

Males born in 1974 had a life expectancy of 59.5 years; in contrast, females born the same year had a life expectancy of 61.8 years. The highest life expectancy for both sexes corresponds to the groups between ages one to four, which is 63.3 years for males and 65.4 years for females.

Sex Differences

While there are sex differentials in mortality, they are not as sharp as those found with regard to age. An analysis of the relative numbers of death by sex in Ecuador for the year 1974 (see Table 18) indicates that, in general, male mortality is slightly higher than female mortality. The data indicate that only in the age groups one to four and 80 and over does the number of female deaths surpass the number of male deaths. The larger number of female deaths at ages over 80 may be explained by the fact that females outnumber males at older ages, therefore, a larger number of them are exposed to the risk of death.* While sound for older people, the argument cannot be used to explain the higher female than male mortality at ages one to four. Then, one of the areas to explore would be whether in Ecuador, an essentially male-dominated society, male infants are better cared for than female infants. This is a possible explanation. Unfortunately, the limitations of this work do not allow a further elaboration on the subject.

Residential Differences

The fact that urban areas, particularly the largest cities of Latin America, have a high concentration of the available health and sanitation facilities and services has frequently been used to support the idea that

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* In fact, the specific death rate for females aged 75 and over (102.0 per thousand) is below that of males in the same age bracket (109.7).

Table 18. Number of Deaths by Age Group and Sex, Ecuador, 1974

Age Group	Number of Deaths Total	 Male	 Female
All Ages	64,278	33,368	30,910
0 - 1	17,161	9,076	8,085
1 - 4	13,708	6,732	6,976
5 - 9	2,471	1,236	1,235
10 - 14	1,186	669	517
15 - 19	1,210	660	550
20 - 24	1,504	850	654
25 - 29	1,199	653	546
30 - 34	1,211	674	537
35 - 39	1,356	740	616
40 - 44	1,439	784	655
45 - 49	1,379	787	592
50 - 54	1,627	945	682
55 - 59	1,467	881	586
60 - 64	2,256	1,267	989
65 - 69	2,069	1,167	902
70 - 74	3,034	1,669	1,365
75 - 79	2,175	1,163	1,012
80 - 84	2,610	1,208	1,402
85 and over	4,480	1,835	2,645
Age unknown	736	372	364

Source: MSP, 1976:27.

mortality should be lower in urban than in rural areas. According to Leonard Linden (1967) the expected differentials in mortality have not been satisfactorily confirmed in the case of Ecuador. Linden, who has dealt with this topic at some length in his doctoral dissertation entitled "An Appraisal of Mortality from the Nations of South America," indicates that there are some observable differences in mortality between the urban and rural areas of Chile, Colombia, and Ecuador, yet, he also points out that:

> Differences in diagnostic and certification accuracy may have influenced the observed differentials. It is known that a larger percentage of the deaths in urban areas are certified by physicians than in rural. Only in the published data for Ecuador is it possible to control for differences in adequacy of diagnosis in order to determine if the observed rural-urban differentials are genuine.
>
> Examination of the statistics for the urbanized provinces Guayas and Pichincha compared to the rest of the country reveals that, when only medically certified deaths are considered, there is no significant difference between the two areas. The percentage of deaths due to causes reflecting the level of medical attention is 69.7 in the most urban provinces and 68.7 in the remainder of the country (Linden, 1967:98-99).

Additional insight into this subject is furnished by Saunders (1961: 57-60), who after evaluating Ecuadorian data pointed out not only that "...registration of deaths tends to be less complete for children than adults," but also that the underregistration of infant deaths is greater in the rural than in the urban areas. The ambiguity of rural-urban differentials in mortality is illustrated in Table 19 which gives data on the number of infant deaths by residence. Thus, in 1966, of all deaths of children under one, more occurred among the rural population, 53.7 percent, than among the urban population, 46.3 percent. Can one conclude then that infant mortality is higher in rural areas than in urban areas? There is not sufficient evidence to do so. Furthermore, since the pro-

Table 19. Number and Percent of Deaths Among the Population Under One Year of Age, by Residence, Ecuador, 1966.

	Urban Areas		Rural Areas	
Total	Number	Percent	Number	Percent
19,777	9,247	46.3	10,730	53.7

Source: OEA, IIE, 1970:176.

portion of infant deaths in 1966 in rural areas (53.7 percent) was lower than the proportion of the nation's population living in rural areas (64 percent in 1962), the figures would seem to indicate a higher infant mortality in urban areas than in rural areas. This conclusion is also unlikely in view of the fact that health services are concentrated in the cities.

Differential mortality in Ecuador remains an almost unexplored area of study. There is a need to analyze the possible effects of migration, of the sex and age distribution of the population, of the availability of health services, of the quality of civil registration, and so on, on the levels of mortality found in urban and rural areas of the country. Health and sanitation services and related relevant public policies in Ecuador as they might affect mortality are analyzed in Chapter VI.

Recent Trends in Mortality

There is a continuous trend towards a decline of both death and infant mortality rates in Ecuador, as shown in Figure 8. There are some yearly fluctuations in which rates of one year are higher than those of the previous one, for example the case of infant mortality rate in 1969 and 1972 and also the case of the crude death rates in 1958. But, in general, the downward trend is fairly consistent.

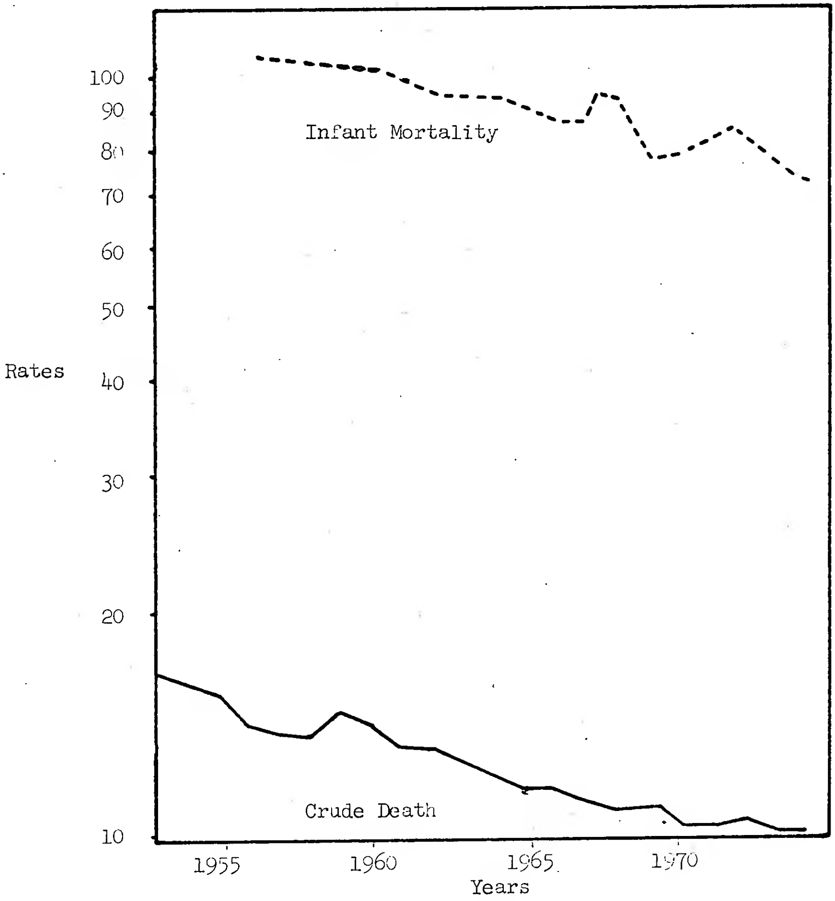


Figure 8. Mortality Trends in Ecuador, 1952-1975

Source: Elaborated by the author from data in Merlo, 1969:17, and DNP, 1976:19.

Causes of Death

The periodically reported data on the causes of death provide useful sources not only for the study of mortality per se but also for the study of the related fields of morbidity and health in general. The frequency with which certain diseases take the lives of the members of a given population is indicative of the state of health of that population. Ecuador's data on the causes of death have two main shortcomings. First, not all of the registered deaths include a specification of their respective causes. According to Saunders (1961:60) in 1955 only 78 percent of all registered deaths included a statement about their causes. Second, the cause of death is not always certified by a qualified person. In 1965, only about 40 percent of all reported deaths were certified by a physician. Regarding the latter point, Linden has stated:

> ...The diagnosis of a physician, who is of necessity trained in diagnostic techniques, has greater validity than that of a layman with relatively limited diagnostic knowledge. Most laymen personally are unfamiliar with any more than a dozen disease entities, while the physician must be aware of a multitude of death-causing diseases (Linden, 1967:55).

Some of the important causes of death in several different years are presented in Table 20. There are extremely high rates of deaths caused by infections of the newborn; for instance, in the 1965-67 period, this category accounted for 551.1 deaths per 100,000 live births. Between the 1957-58 and 1965-67 periods the deaths caused by typhoid fever and malaria were reduced by 91.5 and 84.8 percent respectively. The lethal effects of other maladies such as tuberculosis, whooping cough, measles, and neoplasms have also been reduced, however, these and other infections still take a great toll of life in Ecuador's population every year.

Table 20. Selected Causes of Death in Ecuador, 1957-1958 and 1965-1967

Cause of Death[a]	Average Rates (per 100,000 persons) 1957-58	1965-67	Percent Change
Tuberculosis (B1 - B2)	36.1	20.2	-44.0
Typhoid Fever (B4)	22.1	2.1	-91.5
Whooping Cough (B9)	80.2	54.7	-31.8
Measles (B14)	62.6	33.2	-47.0
Malaria (B16)	25.0	3.8	-84.8
All other infective and parasitic diseases (B17)	43.3	51.5	-18.9
Neoplasms (B18 - 19)	38.1	18.4	-51.7
Anaemias (B21)	23.7	23.2	- 2.1
Pneumonia (B31)	73.3	55.0	-25.0
Bronchitis (B32)	125.5	100.9	-19.6
Gastritis, duodenitis, enteritis, and colitis (B36)	135.0	108.2	-19.8
Heart diseases (B25 - 28)	40.7	8.1	-80.1
Infections of the newborn (B43)[b]	525.0	551.1	- 5.0

Source: Elaborated from data in UN, Statistical Office, 1950-1975.

a) Classified according to Abbreviated International List, 1955 Revision.

b) Rates per 100,000 live-births.

Although the data do not correspond to the time period which is the main focus of this study, the selected causes of death in Chile, Colombia, and Ecuador in the late 1950's are presented in Table 21 primarily for comparative purposes. In broad terms, the data observed indicate that (with the exceptions of senility, ill-defined and unknown causes), in all three countries one of the two main causes of death were diseases of the respiratory system (brochitis, pneumonia, etc.); the second main cause of death varied in each country. In Chile, it was diseases of early infancy; in Colombia, diseases of the digestive system, and in Ecuador, infective and parasitic diseases. The percentage of deaths caused by infective and parasitic diseases was substantially higher in Ecuador (19.9) than in either Chile (7.7) or Colombia (10.8).

The completeness of the data should be kept in mind while interpreting the figures in Table 21. The percentage of deaths attributed to the category "senility, ill-defined and unknown causes" represents a sort of indicator of the completeness of the data. Note, for instance, that Chile had only 8.8 percent of its 1957 deaths in this category, in contrast to 19.5 for Colombia in 1958, and 21.7 for Ecuador in the same year. Had these deaths been properly classified according to their causes, the number and proportions of the other categories would undoubtedly have increased.

Summary and Conclusion

Although in Ecuador there are problems related to the registration of deaths, affecting the accuracy of this study, the data available indicate that in the last few decades there has been a substantial reduction of mortality in the country. The crude death rate has declined fairly constantly and by 1974 was around ten per thousand. The infant mortality

Table 21. Selected Causes of Death: Chile, Colombia, and Ecuador, late 1950's

Cause of Death	Chile, 1957		Colombia, 1959		Ecuador, 1958	
	Number	Percent	Number	Percent	Number	Percent
Total Deaths	91,506	100.0	176,834	100.0	60,950	100.0
Infective and parasitic diseases (B1 - B17)	7,090	7.7	19,316	10.8	12,362	19.9
Malignant neoplasms (B18)	6,847	7.7	6,437	3.9	1,469	2.9
Vascular lesions of the central nervous system (B24 - 25)	4,007	4.6	3,692	2.2	659	1.2
Certain diseases of the respiratory system (B30 - B32)	6,571	7.4	9,717	5.7	1,561	3.5
Certain diseases of the digestive system (B33 - B37)	4,821	5.3	20,740	12.0	6,196	11.9
Certain diseases of early infancy (B42 - 44)	15,368	16.8	16,536	9.5	3,086	5.8
Senility, ill-defined, and unknown causes (B45)	8,103	8.8	35,519	19.5	15,191	21.7

Source: Adapted from Linden, 1967:95-97.

rate has also decreased and at a faster pace than the crude death rate. Today Ecuador still has very high rates of infant mortality, about 70 per thousand live births. More than 50 percent of all deaths occur among the population under five years of age. There are some indications that mortality is higher in rural than in urban areas. And finally, the main causes of death are infective and parasitic diseases as well as certain diseases of the respiratory system, such as bronchitis and pneumonia.

CHAPTER VI
FACTORS RELATED TO MORTALITY DECLINE

The age-old demographic debate on whether mortality decline is primarily due to social and economic development or to improvements in medical technology still continues. The evidence so far presented seems to indicate that mortality decline in countries of European settlement was primarily determined by socioeconomic development (McKeown and Brown, 1955; McKeown and Record, 1962). It has been suggested also that the early introduction of modern methods of disease control might have helped to prolong life in such countries (Stolnitz, 1955:28-29). The mortality decline of Third World countries, demographers tend to agree, should rather be mainly attributed to improvements in health care and to the introduction of modern medical techniques (Stolnitz, 1965; Matras, 1973; Kusukawa, 1965).

The mortality decline experienced by most Latin American nations in the present century, according to Arriaga and Davis (1969), should be examined in two periods: 1) until about 1930 in which the decline was apparently related to improving economic conditions, and 2) after 1930 in which it was due to the application of preventive medicine and public health care measures imported from the developed countries.

The Case of Ecuador

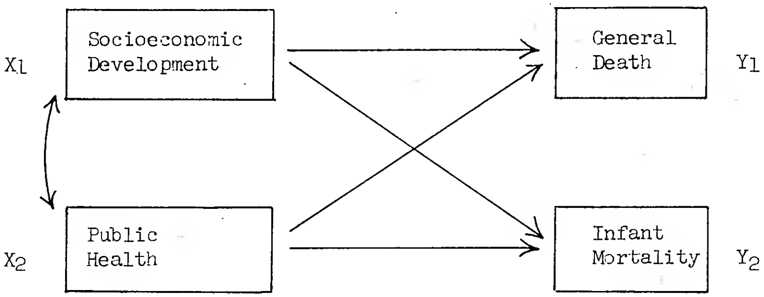
The previous chapter has presented the evidence of mortality decline in Ecuador. This chapter researches the question of whether this decline can be attributed to economic development or to the implementation of health care measures in the 1960-1974 period. Are improvements in public health care the main factor in mortality decline in Ecuador or, is socioeconomic development the main factor? Is it, rather, necessary to have both factors occurring concomitantly in order to achieve a reduction of mortality? All these questions are of crucial importance, not only in terms of what their answers would contribute to the previously mentioned demographic debate, but also in terms of their import to policy formulation in those countries which, like Ecuador, are undergoing economic development and are committed to bring about mortality decline through the improvement of public health care. Politicians and decision makers need to know specifically, what type of public investment yields the best returns. Should budget allocations give priority to the improvement of public health and medical care, or rather, should the priority be given to investments in the infrastructure of socioeconomic development? In the following pages these questions are addressed. In addition we ask the question of whether it is more effective to invest in preventive health care services or in curative health care services. In other words, this chapter tries to establish whether -- in the case of Ecuador -- the implementation of policies to improve the conditions in which people live (reducing their exposure to disease) or the implementation of policies to increase their access to medical technology is more effective in the reduction of mortality.

Methodology

Basic model tested

Using the province as the unit of analysis, this chapter tests whether there is a relationship between socioeconomic development and mortality and/or between public health policy implementation (referred to from now on also as public health) and mortality. Socioeconomic development and public health are the independent variables X_1 and X_2. Mortality is the dependent variable, and is in two forms: Y_1, general death, and Y_2, infant mortality.

A graphical representation of the model to be tested is the following:



Statistical methods

The statistical methods used for analysis include Pearson's correlation coefficient (r) and partial correlation.

1) The correlation coefficient, r, is a measure of the direction (negative or positive) and of the strength of a linear relationship between two interval scale variables x and y. It is based on the assumption of a linear relationship between the variables; $r = 0$ means no linear relationship but, obviously, a non-linear relationship between the variables is possible. The square of r (r^2) gives a measure of the strength of the linear relationship.

2) The partial correlation is a measure of association which describes the relationship between two variables adjusting for the effects of one or more additional variables.

Synchronic versus diachronic analyses

This study involves two approaches: 1) a synchronic or cross-sectional approach and 2) a diachronic or longitudinal approach. The synchronic analysis studies the variation of data on the provinces of Ecuador at two different points in time, circa 1962 and circa 1974. Since the data on mortality, development, and public health correspond to approximately the same time period, in order to make causal-type statements, it is necessary to assume that socioeconomic development and public health policy implementation occurred prior to mortality. Other assumptions essential for this study are that the independent variables vary concomitantly and are not significantly related to each other, and that there are no alternative explanations of mortality.

The data for the diachronic analysis show the change that dependent and independent variables experienced between 1962 and 1974 in each of the provinces. In contrast to the synchronic approach, which gives a picture of the conditions characterizing the country at two fixed points in time approximately 12 years apart, this approach deals with an ongoing process. It addresses the degree to which conditions have improved or deteriorated from one date to another and their effect on mortality. The assumption that both socioeconomic development and public health policy implementation antedate mortality is still required in this approach.

The variables and their indicators

The dependent variables are general death, Y_1, measured by the crude death rate (CDR), and infant mortality, Y_2, measured by the infant mortality rate (IMR). In the synchronic analysis, the dependent variables are measured by the raw values of the CDR and IMR; in the diachronic analysis, the difference obtained by subtracting the 1974 values from the 1962 values was standardized using Mattelart and Garretón's (1965) procedure, described later in this chapter, by which higher scores represent more favorable conditions and lower scores, less favorable conditions.

Socioeconomic development, X_1, is measured by an index composed of three different indicators: 1) urbanization, or the percentage of population living in provincial capitals and/or cities of 20 thousand inhabitants or more*; 2) illiteracy, or the percentage of illiterates among the population aged six and over**; and 3) agrarianism, or the percentage of economically active population (aged 12 and over) engaged in agriculture and related activities, including hunting and fishing. Public health policy implementation, X_2, is a composite of two variables: 1) the living conditions index, whose indicators are (a) water, or the percentage of dwellings with potable water systems and (b) sewage, or the percentage of dwellings with sewage services; and 2) the access to medical technology index, whose indicators are (c) hospital beds, or the number of hospital beds per 1,000 population and (d) doctors, or the number of doctors per 10,000 population.

The selection of the CDR as an indicator of mortality does not need much explanation as it is a measure frequently used in studies of mortality involving interval scale variables. The IMR, although partially reflected in the CDR, has been included as a separate measure because an unusually large percentage of deaths in Ecuador occurs among children aged one or younger and therefore, there is a need to determine what factors are most effective in its reduction. The use of the indicator life expectancy at birth was considered as a possible indicator of mortality, however, the limitations of data (census results by provinces were not available by mid-1976) made their use impossible in this study.

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* This measure of urbanization was preferred over that provided by the national census because the latter classifies as urban not only provincial capitals but also canton seats, some of which have population well below a thousand inhabitants (one extreme case, Sucumbíos, was in 1962 a canton seat with only 132 inhabitants). The measure used in this study is deemed by the author to be a more sensitive one because it combines two of the most commonly used criteria of urbanization: population size and politico-administrative organization.

** In 1974, aged ten and over.

The indicators for the independent variables were selected on a combined criteria of availability for the time periods with which the study deals, their reliability relative to other alternate indicators, their estimated relevance to the dimensions being studied, and their utilization in other studies. Indicators which did not meet these criteria were rejected. For instance, the indicator number of immunizations, although potentially useful for tapping public health policy implementation, was left out because it was not properly disaggregated by province at the earlier date considered (circa 1960) and its figures were not found reliable enough; they differed from one official report to another. Similarly, the indicator percentage of illiterates was preferred over the indicator percentage of population with at least one year of secondary school because it has been more frequently used in studies of social and economic development and because the secondary school depends on the number of years in primary school, which in Ecuador in the past was not uniform in all areas of the country.

The mode of index construction

The indexes socioeconomic development and public health policy implementation were constructed using a method formulated by Mattelart and Garretón (1965) in a study of social regionalization in Chile.*

The first important characteristic of this method is that it enables the standardization of values of the different indicators. This standardization, in turn, facilitates the interpretation of data in at least two ways: 1) It avoids the confusion usually associated with comparisons of data whose units of measurement differ from one to another. For instance, the indicators presently used to construct the public health policy implementation variable are given variously in terms of percentages of population, percentages of dwellings, or ratios of services per 1,000 and 10,000 inhabitants. 2) It provides positive values, comparable from one indicator to another. In all cases, a high standardized value indicates more favorable conditions while a low standardized value indicates less favorable ones.

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* Factor analysis is an alternative method considered but it was not utilized because of two considerations: 1) the total number of indicators available was relatively small (about ten) and 2) rather than classifying Ecuador's provinces in a continuum -- as factor analysis does -- it was deemed more appropriate to rank them in a number of "types" as it was done in the case of Chile.

Mattelart and Garretón's method of index construction also leads to the elaboration of a final social typology -- as well as several subtypologies -- in which the provinces of Ecuador are rank ordered according to the social conditions prevalent in them at a given time period. Provinces with the most favorable social conditions occupy top positions in the final typology or in the subtypologies; in contrast, provinces with the least favorable social conditions occupy bottom positions. This ranking method is very helpful for the qualitative analysis of social conditions. The final typology is a sort of summary statement of what the data for each province indicate. Most of the applications of this method in the past have been guided by the conceptual framework of integration and marginality (see Mattelart, 1965; Mattelart and Garretón, 1965) and have been oriented to purely descriptive endeavors.

The construction of the indexes and formulation of the final typology require the following steps: 1) Starting with the raw values of the indicators (see Tables 22 and 23 and 24, with data for 1962 and 1974 and

Table 22. Indicators Used for Variables and for Index Construction, by Province, Ecuador, c. 1962

	Indicator								
Province	Crude Death Rate, 1961-63	Infant Mortality Rate, 1961-63	Percent of Dwellings w. Potable Water,[a] 1962	Percent of Dwellings w. Sewage Service,[b] 1962	Hospital Beds per 1,000 Pop., 1965	Doctors per 10,000 Pop., 1962	Percent of Urban Pop.,[c] 1962	Percent of Illit. Pop.,[d] 1962	Percent of Pop., in Ag.,[e] 1962
Azuay	15.9	102.4	23.6	17.3	2.3	2.3	22.0	34.4	59.2
Bolívar	12.7	88.5	16.1	7.6	1.2	.8	7.5	46.1	83.1
Cañar	14.3	91.7	15.5	6.3	1.8	1.1	7.2	43.8	61.7
Carchi	15.2	122.4	38.5	15.7	1.9	1.9	17.4	25.8	60.9
Cotopaxi	22.2	142.9	27.1	9.2	1.4	1.0	9.4	47.7	66.6
Chimborazo	20.3	133.9	29.2	14.9	1.4	2.0	15.0	55.1	72.2
El Oro	8.9	66.5	49.2	34.1	2.3	2.1	18.0	20.9	62.8
Esmeraldas	9.3	73.7	12.2	16.4	1.1	.9	26.7	44.7	67.2
Galápagos	.8	144.1	45.6	27.3	.0	.0	.0	13.3	58.0
Guayas	10.7	95.0	60.1	65.1	3.8	4.5	55.0	24.0	35.3
Imbabura	20.3	138.6	37.7	12.6	1.5	2.4	14.8	46.0	50.1
Loja	8.6	57.1	23.1	7.2	.9	1.0	9.4	31.2	73.9
Los Rios	12.6	97.8	17.9	22.7	1.1	.7	14.8	44.1	78.2
Manabí	9.7	65.5	4.6	31.1	.8	2.5	10.7	42.9	73.7
Morona S.	11.9	79.7	3.4	6.2	1.9	2.0	5.1	40.2	81.2
Napo	5.1	24.8	1.8	6.9	1.0	1.6	4.1	55.5	72.4
Pastaza	10.4	69.6	26.0	26.3	2.8	3.6	16.7	39.4	63.4
Pichincha	12.3	102.0	75.9	56.7	4.5	6.5	60.3	24.7	38.1
Tungurahua	19.7	137.4	40.0	26.5	2.2	1.7	29.9	32.7	55.7
Zamora Ch.	12.0	74.1	18.6	3.9	.0	.8	9.0	31.1	78.0
Nation[f]	12.6	95.4	28.3	20.7	1.7	2.0	17.7	37.2	64.1

Source: Compiled and computed by the author from data in INE, 1961-1964a, 1973c; JNPC, 1964a.

a) Piped water systems, mostly public but includes private installations.

b) Toilet facilities, including those for private dwellings (or single family dwellings) and collective (or multi-family) dwellings, connected to public sewage systems as well as dwellings with latrines and septic tanks.

c) Population living in provincial capitals and/or cities with 20,000 inhabitants or more.

d) Population aged six and over who are reportedly unable to read or write a paragraphs in any language.

e) Population aged 12 and over engaged in agriculture and related activities (including hunting and fishing).

f) Mean of province figures.

Table 23. Indicators Used for Variables and for Index Construction, by Province, Ecuador, c. 1974

	Indicator								
Province	Crude Death Rate, 1972-74	Infant Mortality Rate, 1972-74	Percent of Dwellings w. Potable Water,[a] 1974	Percent of Dwellings w. Sewage Service, 1974	Hospital Beds per 10,000 Pop., 1973	Doctors per 10,000 Pop., 1972	Percent of Urban Pop.,[b] 1974	Percent of Illit. Pop.,[c] 1974	Percent of Pop. in Ag.,[d] 1974
Azuay	13.7	82.6	30.0	26.2	2.2	3.3	28.5	24.6	40.6
Bolívar	11.8	77.2	13.2	12.2	.9	1.3	7.9	34.7	75.7
Cañar	11.7	64.0	19.7	10.6	.5	1.7	7.5	32.5	50.9
Carchi	11.2	103.2	43.9	35.6	1.4	1.8	20.2	16.5	57.0
Cotopaxi	19.4	121.9	22.3	11.5	1.2	1.7	9.8	40.4	65.7
Chimborazo	15.8	111.3	52.8	33.1	1.4	1.5	19.1	43.8	61.8
El Oro	7.5	51.9	55.4	47.8	1.7	1.8	34.0	12.1	51.4
Esmeraldas	8.6	88.1	25.8	25.4	1.1	1.3	29.6	29.2	55.3
Galápagos	4.0	49.2	62.6	53.0	10.7	10.0	3.2	5.8	32.3
Guayas	8.0	81.2	52.1	62.0	2.9	4.9	59.0	15.5	29.9
Imbabura	17.2	108.4	48.3	30.3	1.4	2.4	19.0	34.0	43.4
Loja	6.8	47.7	28.6	12.9	1.1	1.1	13.8	19.9	69.4
Los Rios	8.2	64.3	17.4	27.0	.6	1.1	18.6	30.6	72.9
Manabí	6.7	45.1	24.8	37.0	.9	1.3	20.3	31.7	67.6
Morona S.	9.2	67.5	12.7	12.9	2.3	1.4	3.6	24.9	73.9
Napo	6.6	38.7	8.0	13.4	4.7	1.9	3.4	30.2	61.5
Pastaza	8.0	62.0	34.0	34.3	3.5	3.9	20.0	29.9	59.7
Pichincha	9.5	78.1	73.7	66.2	3.8	9.2	63.5	14.8	19.2
Tungurahua	15.8	104.3	42.7	33.6	1.8	2.8	27.5	26.0	50.2
Zamora Ch	15.1	85.5	21.0	10.5	3.6	2.0	7.8	18.3	76.1
Nation[e]	10.7	76.6	34.4	29.7	1.9	2.3	20.8	25.8	55.7

Source: Compiled and computed by the author from data in INE, 1973-76a, 1974c; OCN, n.d.; DNP, 1974:21.

a) Piped water from public systems.
b) Population living in provincial capitals and/or cities with 20,000 inhabitants or more
c) Population aged ten and over who are reportedly unable to read and write.
d) Population aged 12 and over engaged in agriculture and related activities (including hunting and fishing).
e) Mean of province figures.

Table 24. Indicators of Change Used for Variables and Index Construction, by Province, c. 1962 to c. 1974

	Indicator (Change Occurring from c. 1962 to c. 1974)								
Province	Crude Death Rate	Infant Mortality Rate	Percent of Dwellings w. Potable Water	Percent of Dwellings w. Sewage Service	Hospital Beds per 10,000 Pop.,	Doctors per 10,000 Pop.,	Percent of Urban Pop.,	Percent of Illit. Pop.,	Percent of Pop., in Ag.
Azuay	-2.2	-19.8	6.4	8.9	- .1	1.0	.5	- 9.8	-18.6
Bolívar	- .9	-11.3	-2.9	4.6	- .3	.5	.4	-11.4	- 7.4
Cañar	-2.6	-27.7	4.2	4.3	-1.3	.6	.3	-11.3	-10.8
Carchi	-4.0	-19.2	5.4	19.1	- .5	- .1	3.2	- 9.3	- 3.9
Cotopaxi	-2.8	-21.0	-4.8	2.3	- .2	.7	.4	- 7.3	- .9
Chimborazo	-4.5	-22.6	23.6	18.2	.0	- .5	4.1	-11.3	-10.4
El Oro	-1.4	-14.6	6.2	13.7	- .6	- .4	16.0	- 8.8	-11.4
Esmeraldas	- .7	14.4	13.2	9.0	.0	.4	2.9	-15.5	-11.9
Galápagos	3.2	-94.9	17.0	26.3	10.7	10.0	3.2	- 7.5	-25.7
Guayas	-2.7	-13.8	-8.0	-3.1	- .9	.4	4.0	- 8.5	- 5.4
Imbabura	-3.1	-30.2	10.6	18.3	- .1	.0	4.2	-12.0	- 6.7
Loja	-1.8	- 9.4	5.5	5.7	.2	.1	4.4	-11.3	- 4.5
Los Rios	-4.4	-33.5	- .5	4.3	- .5	.4	3.8	-13.5	- 5.3
Manabí	-3.0	-20.4	20.2	6.1	.1	-1.2	10.4	-11.2	- 6.1
Morona S.	-2.7	-12.2	9.2	6.7	.4	- .6	-1.5	-15.3	- 7.3
Napo	1.5	13.9	6.2	6.5	3.7	.3	- .7	-25.3	-10.9
Pastaza	-2.4	- 7.6	8.0	8.0	.7	.3	3.3	- 9.5	- 3.7
Pichincha	-2.8	-23.9	-2.2	9.5	- .7	3.3	3.2	- 9.9	- 8.9
Tungurahua	-3.9	-33.1	2.7	7.1	- .4	1.1	-2.4	- 6.7	- 5.5
Zamora Ch.	3.1	11.4	2.4	6.6	3.6	1.2	-1.2	-12.8	- 1.9
Nation[a]	-1.9	-18.8	6.1	9.0	.7	.9	3.2	-11.4	- 8.4

Source: Tables 22 and 23.

a) Mean of province figures.

for the change occurring in between these dates), a logarithmic scale for each indicator is constructed by (a) calculating the logarithms of the extreme values of each indicator, (b) dividing the difference between both logarithms by ten -- this difference fixes the limits between the resultant ten types, (c) adding the difference to the inferior value successively to obtain the limits of the type, and (d) calculating the number corresponding to each logarithm. The provinces whose values represent the most favorable conditions at the fixed points in time or the most favorable change, be it lower mortality, greater number of hospital beds, or smaller percentage of illiterates, are classified in the higher ranks starting from type I and descending to type X, which represents the least favorable conditions or the least favorable change. 2) Once each province's indicator is placed in one of the types, its value is standardized using a conversion table (see Mattelart and Garretón, 1965:167) which contains the ten types subdivided further in ten subtypes, each with its higher limit (the standardized values for 1962 and 1974 and for the 1962 to 1974 change are presented in Tables 25, 26, and 27). 3) The subtypologies (i.e., the indexes used for this chapter) are obtained by calculating the means of the standardized indicators in each group. 4) The final typology is obtained by calculating the mean of the subtypologies and indicators which represent variables and whose values have been standardized. 5) The place of the indexes of the final typology in the conversion table gives the final types.

Synchronic Analysis

Social typology of the provinces

The social typologies of the provinces of Ecuador, developed using cross-sectional data for 1962 and 1974, are presented in Tables 28 and

Table 25. Standardized Values[a] of the Indicators Used for Variables and for Index Construction, by Province, Ecuador, c. 1962

	Indicator								
Province	General Death	Infant Mortality	Dwellings with Water	Dwellings with Sewage	Hospital Beds	Doctors	Urban Population	Illiterate Population	Agrarian Population
Azuay	14.0	15.8	53.6	42.1	42.1	31.6	68.1	25.5	24.9
Bolívar	15.0	20.5	42.1	20.5	16.1	12.1	33.2	14.3	11.8
Cañar	14.7	20.0	41.1	16.1	26.1	16.1	32.4	15.7	20.0
Carchi	14.3	12.7	80.5	33.2	33.2	24.3	53.6	40.2	20.5
Cotopaxi	11.8	11.5	66.5	26.1	19.6	15.4	40.2	14.0	18.6
Chimborazo	12.4	12.4	68.1	32.4	20.0	25.5	51.1	12.7	15.8
El Oro	20.0	32.4	86.5	68.1	41.1	26.1	66.5	53.6	19.6
Esmeraldas	19.6	26.1	40.2	41.1	12.7	12.7	66.5	15.0	16.1
Galápagos	110.0	11.3	84.5	53.6	11.3	10.2	10.2	110.0	25.5
Guayas	18.2	19.6	107.4	110.0	86.5	86.5	108.6	42.1	68.1
Imbabura	12.1	11.8	78.6	31.6	20.5	32.4	49.9	14.7	32.2
Loja	20.5	42.1	52.3	20.0	11.8	15.8	41.1	32.4	15.0
Los Rios	15.4	19.1	49.9	49.9	12.4	11.8	48.7	15.4	12.4
Manabí	19.1	33.2	20.5	66.5	11.5	33.2	42.1	16.1	14.7
Morona S.	17.8	24.9	16.1	15.8	32.4	24.9	26.1	20.0	12.1
Napo	33.2	110.0	15.8	19.6	12.1	20.0	25.5	12.4	15.4
Pastaza	18.6	31.6	64.9	51.1	53.6	53.6	52.3	20.5	19.1
Pichincha	15.8	16.1	110.0	107.4	110.0	110.0	110.0	41.1	110.0
Tunguahua	12.7	12.1	82.5	52.3	40.2	20.5	86.5	26.1	26.1
Zamora Ch.	16.1	25.5	51.1	12.7	11.0	12.4	39.3	33.2	12.7

a) Values go in descending order from most favorable conditions to least favorable conditions.

Table 26. Standardized Values[a] of the Indicators Used for Variables and for Index Construction, by Province, Ecuador, c. 1974

Province	Indicator								
	General Death	Infant Mortality	Dwellings with Water	Dwellings with Sewage	Hospital Beds	Doctors	Urban Population	Illiterate Population	Agrarian Population
Azuay	20.5	24.3	42.1	32.4	32.4	33.2	64.9	20.5	33.2
Bolívar	24.9	26.1	20.5	12.2	15.8	12.1	25.5	14.0	11.5
Cañar	25.5	41.1	31.6	12.1	12.4	16.1	20.0	14.7	21.5
Carchi	26.1	16.1	68.1	49.9	24.3	19.1	52.3	33.2	19.1
Cotopaxi	12.4	12.4	33.2	12.4	20.5	15.8	26.1	12.7	15.0
Chimboraxo	15.4	12.7	84.5	53.6	24.9	15.4	42.1	12.4	15.4
El Oro	49.9	66.5	86.5	84.5	26.1	19.6	68.1	53.6	20.0
Esmeraldas	39.3	20.5	40.2	33.2	19.6	12.4	66.5	18.6	19.6
Galápagos	110.0	68.1	107.4	86.5	110.0	110.0	12.1	110.0	52.3
Guayas	42.1	24.9	82.5	107.4	42.1	53.6	107.4	41.1	53.6
Imbabura	12.7	15.4	80.5	41.1	25.4	26.1	41.1	14.3	32.4
Loja	51.1	84.5	41.1	16.1	20.0	11.8	33.2	26.1	12.4
Los Rios	40.1	40.1	26.1	42.1	12.7	11.1	40.2	15.4	12.1
Manabí	52.3	86.5	39.3	48.7	16.1	12.7	53.6	15.0	12.7
Morona S.	33.2	39.3	20.0	15.8	33.2	15.0	12.7	20.0	11.8
Napo	53.6	110.0	12.7	15.4	68.1	20.0	12.4	15.8	15.8
Pastaza	31.1	42.1	54.6	51.1	51.1	42.1	51.1	16.1	16.1
Pichincha	32.4	25.5	110.0	110.0	53.6	107.4	110.0	42.1	110.0
Tungurahua	15.8	15.8	66.5	52.3	31.6	32.4	63.4	19.6	26.1
Zamora Ch.	16.1	23.7	32.4	11.8	52.3	20.5	20.5	32.4	11.3

a) Values go in descending order from most favorable conditions to least favorable conditions.

Table 27. Standardized Values[a] of the Indicators of Change Used for Variables and for Index Construction, by Province, Ecuador, c. 1962 to c. 1974

	Indicator (Change Occurring from c. 1962 to c. 1974)								
Province	General Death	Infant Mortality	Dwellings with Water	Dwellings with Sewage	Hospital Beds	Doctors	Urban Population	Illiterate Population	Agrarian Population
Azuay	66.5	66.5	66.5	63.4	11.3	15.4	68.1	20.0	86.5
Bolívar	33.2	59.0	16.2	47.5	10.8	12.1	20.5	31.6	41.2
Cañar	78.6	80.5	53.6	42.2	10.0	12.4	20.0	26.1	51.1
Carchi	107.4	64.9	61.9	107.4	10.2	10.8	41.2	18.1	20.5
Cotopaxi	82.5	68.1	12.7	33.2	11.0	12.7	20.5	15.4	12.4
Chimborazo	102.6	76.8	110.0	102.6	11.6	10.2	51.1	26.1	49.9
El Oro	42.2	63.4	64.9	86.6	10.2	10.5	110.0	18.7	53.6
Esmeraldas	32.4	12.4	102.6	60.5	11.6	11.8	40.2	53.6	68.1
Galápagos	12.4	110.0	104.9	110.0	110.0	110.0	41.2	15.8	110.0
Guayas	80.5	61.9	12.4	12.7	10.0	11.9	49.9	16.2	30.9
Imbabura	86.6	82.5	86.6	104.9	11.3	11.0	52.3	32.4	33.2
Loja	53.6	53.6	63.4	46.7	12.1	11.3	53.6	26.1	25.5
Los Rios	104.9	86.6	26.1	42.2	10.2	11.8	48.7	42.2	26.1
Manabí	84.5	66.5	107.4	49.9	11.8	10.0	86.6	25.5	32.4
Morona S.	80.5	60.4	84.5	53.6	12.4	10.2	15.8	52.3	40.2
Napo	20.5	12.1	64.9	51.1	42.2	11.6	19.6	110.0	52.3
Pastaza	68.1	52.3	68.1	64.9	12.7	11.6	42.2	19.6	20.0
Pichincha	82.5	78.6	20.5	68.1	10.2	42.2	41.2	20.5	42.2
Tungurahua	110.0	84.5	52.3	61.9	10.5	15.8	15.4	15.0	31.6
Zamora Ch.	12.7	12.7	12.7	52.3	41.2	16.2	16.2	33.2	12.7

a) Values go in descending order from most favorable conditions to least favorable conditions.

29, respectively. In addition to an overall final typology, there are four subtypologies for each year.

In 1962 (see Table 28) none of Ecuador's provinces met the conditions required for classification in the first two types of the final typology. Dividing the ten types into two groups, the upper five representing more favorable conditions and the lower five representing less favorable conditions, it can be observed that only six provinces of Ecuador had overall more favorable social conditions; in contrast, the majority of provinces had relatively less favorable social conditions in 1962. The province with the best overall social conditions is Pichincha, where the capital of the nation is located; it occupies rank eight out of type I. Next, in descending order are Galápagos, Guayas, and Napo (in ranks two, three, and eight of type IV, respectively). The least favorable social conditions correspond to Cotopaxi and Bolívar, both of which are in rank two of type VIII. Looking at the subtypologies and again dichotomizing each of them into upper - more favorable, and lower - less favorable halves, a very significant fact appears: there is very little correspondence between the provinces' location in the first two typologies and their location in the last two typologies. Most provinces had less favorable mortality (subtypologies I and II); in contrast, half of them had more favorable public health (subtypology III), and seven provinces had more favorable socioeconomic development (subtypology IV). Contrary to expectations, the provinces with the lowest general death (Galápagos, in rank one of type I) and the lowest infant mortality (Napo, in rank one of type I and Loja, in rank one of type V) are not at the top of the public health and socioeconomic development typologies. As a matter of fact, Napo and Loja are not even within the upper five types, representing more favorable public health and socioeconomic development. Thus, no clear relationship

Table 28. Social Typology of the Provinces of Ecuador, 1962

Type	Final Typology			Subtypology I General Death			Subtypology II Infant Mortality			Subtypology III Public Health			Subtypology IV Socioec. Devel.		
	Rank	Province	Indic.	Rank	Province	Indic.	Rank	Province	Indic.	Rank	Province	Indic.	Rank	Province	Indic.
I.				1	Galápagos	110.0	1	Napo	110.0	1	Pichincha	109.3	10	Pichincha	87.4
										5	Guayas	97.6			
II.															
III.	8	Pichincha	57.2							9	Pastaza	55.8	8	Guayas	57.6
										9	El Oro	55.5			
IV.	2	Galápagos	52.5							4	Tungurahua	48.9	5	Galápagos	43.6
	3	Guayas	52.1							10	Carchi	42.8	7	Tungurahua	42.6
	8	Napo	44.5							10	Azuay	42.4	9	El Oro	43.2
V.	3	El Oro	40.4				1	Loja	42.1	2	Imbabura	41.0	4	Azuay	37.5
	9	Pastaza	34.2							3	Galápagos	40.0	5	Carchi	38.1
										7	Chimborazo	36.5			
VI.	5	Tungurahua	30.0	1	Napo	33.2	1	Manabí	33.2	1	Manabí	32.9	1	Imbabura	32.6
	6	Loja	29.3				2	El Oro	32.4	2	Cotopaxi	31.9	2	Esmeraldas	32.5
	8	Azuay	27.9				3	Pastaza	31.6	3	Los Rios	31.0	4	Pastaza	30.6
	9	Manabí	27.4							10	Esmeraldas	26.3	6	Loja	29.5
	9	Carchi	27.0										7	Zamora Ch.	28.4
	10	Esmeraldas	26.2										10	Chimborazo	26.5
VII.	3	Imbabura	24.3				1	Esmeraldas	26.1	2	Loja	25.0	1	Los Rios	25.5
	6	Zamora Ch.	22.9				2	Zamora Ch.	25.5	2	Cañar	24.9	2	Manabí	24.3
	6	Los Rios	22.7				3	Morona S.	24.9	6	Bolívar	22.7	3	Cotopaxi	24.4
	8	Chimborazo	22.0							7	Morona S.	22.3	6	Cañar	22.7
	9	Morona S.	21.1							8	Zamora Ch.	21.8			
	10	Cañar	20.6												
VIII.	2	Cotopaxi	19.9	1	Loja	20.5	1	Bolívar	20.5				2	Bolívar	19.8
	2	Bolívar	19.5	2	El Oro	20.0	2	Cañar	20.0				3	Morona S.	19.4
				3	Esmeraldas	19.6	3	Guayas	19.6				7	Napo	17.8
				4	Manabí	19.1	4	Los Rios	19.1						
				5	Pastaza	18.6									
				6	Guayas	18.2									
				7	Morona S.	17.8									
IX.				1	Zamora Ch.	15.1	1	Pichincha	16.1	9	Napo	16.9			
				2	Pichincha	15.8	2	Azuay	15.8						
				3	Los Rios	15.4									
				4	Bolívar	15.0									
				5	Cañar	14.7									
				6	Carchi	14.3									
				7	Azuay	14.0									
X.				1	Tungurahua	12.7	1	Carchi	12.7						
				2	Chimborazo	12.4	2	Chimborazo	12.4						
				3	Imbabura	12.1	3	Tungurahua	12.1						
				4	Cotopaxi	11.8	4	Imbabura	11.8						
							5	Cotopaxi	11.5						
							6	Galápagos	11.3						

between either public health and mortality or socioeconomic development and mortality are evident in 1962 at this analytical stage.

In 1974 (see Table 29), again no province appears in type I of the final typology. There are eight provinces in the upper five types representing more favorable social conditions, and 12 in the less favorable, lower five types. The politico-administrative subdivision with the most favorable overall social conditions is Galápagos, which occupies rank one of type II. Next in descending order are Pichincha and El Oro, in ranks six and ten of type III. The least favorable conditions belong to Cotopaxi, which is in rank one of type IX at the bottom. Comparing the subtypologies of Tables 28 and 29, the greater heterogeneity and contrasting conditions of Ecuador's provinces in 1974 became very obvious, as they are more scattered than in 1962. There is a substantial correspondence between some provinces' location in the first and second subtypologies; thus, Galápagos, Manabí, Loja and El Oro not only have high ranks -- translated as lower mortality -- in terms of general death but also in terms of infant mortality. Similarly, there is correspondence between some provinces' location in the third and fourth subtypologies; Galápagos, Pichincha and El Oro place high both in terms of public health and of socioeconomic development.

In 1974 there is some consistency with regards to the relatively more favorable or less favorable conditions of the provinces, indicated by whether they are within the upper or the lower five types, respectively in each subtypology; for instance, Bolívar and Cotopaxi are consistently at the lowest ranks in the different columns of Table 29. Yet, there is not sufficient evidence to assert a definite correspondence between either the provinces' public health and mortality or their socioeconomic develop-

Table 29. Social Typology of the Provinces of Ecuador, 1974

Type	Final Typology			Subtypology I General Death			Subtypology II Infant Mortality			Subtypology III Public Health			Subtypology IV Socioec. Devel.		
	Rank	Province	Indic.	Rank	Province	Indic.	Rank	Province	Indic.	Rank	Province	Indic.	Rank	Province	Indic.
I.				1	Galápagos	110.0	1	Napo	110.0	3	Galápagos	103.5			
										7	Pichincha	95.2			
II.	1	Galápagos	84.9				1	Manabí	85.5	9	Guayas	71.4	1	Pichincha	87.4
							2	Loja	84.5						
III.	6	Pichincha	60.1				1	Galápagos	68.1				1	Guayas	67.4
	10	El Oro	54.4				2	El Oro	66.5				8	Galápagos	58.1
IV.	2	Napo	51.8	1	Napo	53.6				1	El Oro	54.1	6	El Oro	47.2
	2	Guayas	51.4	2	Manabí	52.3				4	Pastaza	49.7			
	4	Manabí	48.8	3	Loja	51.1				8	Tungurahua	45.7			
	7	Loja	45.4	4	El Oro	49.7				9	Chimborazo	44.6			
										10	Imbabura	43.3			
V.	2	Pastaza	40.2	1	Guayas	42.1	1	Pastaza	42.1	3	Carchi	40.3	4	Azuay	37.5
				2	Pastaza	41.1	2	Cañar	41.1	9	Azuay	35.0	9	Esmeraldas	34.9
				3	Los Rios	40.2	3	Los Ríos	40.2	9	Esmeraldas	34.6	9	Carchi	34.9
							4	Morona S.	39.3						
VI.	2	Esmeraldas	32.3	1	Morona S.	33.2				6	Zamora Ch.	29.3	1	Tungurahua	33.0
	3	Los Rios	31.5	2	Pichincha	32.4				6	Manabí	29.2	6	Imbabura	29.3
	5	Azuay	29.8							7	Napo	29.1	8	Pastaza	27.8
	5	Carchi	29.4										9	Manabí	27.1
	8	Tungurahua	27.6												
	9	Morona S.	27.1												
VII.	1	Cañar	25.8	1	Carchi	26.1	1	Bolívar	26.1	6	Los Rios	23.1	5	Loja	23.9
	2	Imbabura	25.2	2	Cañar	25.5	2	Pichincha	25.5	7	Loja	22.3	6	Chimborazo	23.3
	5	Chimborazo	23.5	4	Bolívar	24.3	3	Guayas	24.9	10	Morona S.	21.0	7	Los Rios	22.6
	6	Zamora Ch.	22.6				4	Azuay	24.3				9	Zamora Ch.	21.4
	10	Bolívar	20.6				5	Zamora Ch.	23.7						
VIII.				1	Azuay	20.5	1	Esmeraldas	20.5	1	Cotopaxi	20.5	6	Cañar	18.4
										6	Cañar	18.1	7	Cotopaxi	17.9
													9	Bolívar	17.0
IX.	1	Cotopaxi	15.8	1	Zamora Ch.	16.1	1	Carchi	16.1	4	Bolívar	15.1	5	Morona S.	14.9
				2	Tungurahua	15.8	2	Tungurahua	15.8				5	Napo	14.6
				3	Chimborazo	15.4	3	Imbabura	15.4						
X.				1	Imbabura	12.7	1	Chimborazo	12.7						
				2	Cotopaxi	12.4	2	Cotopaxi	12.4						

ment and mortality. It is very important to note that, in 1974, Pichincha and Guayas, the largest provinces of the country, had very favorable public health and socioeconomic conditions, yet they were far from having the most favorable (i.e., the lowest) general death and infant mortality.

Statistical analysis

Using correlation analysis as a first step in the analysis of c. 1962 data, the following correlation matrix (Table 30) is derived:

Table 30. Correlation Matrix, c. 1962 Data (1)

	Zero-Order Correlations		Partial Correlations	
	X_1 Socioeconomic Development	X_2 Public Health	X_1 (controlling by X_2)	X_2 (controlling by X_1)
Y_1 General Death	.09	.02	-.33	.32
Y_2 Infant Mortality	.25	.20	.18	-.10

The first significant observation from Table 30 is that all the zero-order correlation coefficients are positive and very small. The relationships of each of the independent variables socioeconomic development (X_1) and public health (X_2) with infant mortality (Y_2) are greater than their relationships with general death (Y_1). At this stage of the analysis, it appears that socioeconomic development has a slightly higher relationship with infant mortality than does public health. But the partial correlations, in contrast, indicate that 1) adjusting for the effects of public health, socioeconomic development is negatively related to general death and positively related to infant mortality; 2) adjusting for the effects of socioeconomic development, public health is positively related to general death and negatively related to infant mortality. Socioeconomic development and public health individually explain about 11 (r^2 = .108) and ten (r^2 = .100) percent of the variation in general death and only about three (r^2 = .033) and one (r^2 = .009) percent of the variation in infant mortality.

It should be noted at this point that no mention is made of significance levels. The reason is that significance levels are applicable to sample data, from which one wants to infer to the whole population. In the present study the data refer to the population itself, therefore, in theory, all relationships are significant and thus the present emphasis on direction and strength of relationships.

The analysis of data for about 1962 indicates that the main factors accounting for the variations in both mortality variables general death and infant mortality are unknown; apparently, this analysis is excluding more relevant variables. Of the variables used, the greater association belongs to socioeconomic development. But, it seems that mortality cannot simply be explained by parallel increases or decreases of both socioeconomic development and public health policy implementation but rather by particular combinations of both variables. Thus for instance, according to the present findings, greater socioeconomic development and lower public health are related to lower general death and, similarly, lower socioeconomic development and greater public health are related to lower infant mortality.

Besides the fact that the independent variables explain only small percentages of the variations in the dependent variables, the relationships indicated by the previous partial correlations are affected by the problem of multicollinearity, i.e., there is a high correlation (r = .94) between the independent variables. About 88 percent (r^2 = .877) of the variation in one variable is attributable to the other. The small degrees of association and problem of multicollinearity would seem to suggest that the present analysis does not benefit much from the use of partial correlation. On that basis, perhaps the analysis should have been restricted to simple correlations. This alternative was considered but bypassed because, although partial correlations are relatively invalidated when the independent variables are highly correlated, this method of analysis adds information not provided by zero-order correlations; in a few cases, they indicate changes in the direction of the relationships between the variables. In 1962, the zero-order correlation indicated a negligible positive relationship between socioeconomic development and general mortality; in contrast, the partial correlation indicated a modest negative relationship between these variables.*

There seems to be a certain parallel between the social conditions in Ecuador in about 1962 and those of Latin America in general in the years before 1930. Similar to what Arriaga and Davis (1969) found for Latin American countries using pre-1930 data, in the provinces of Ecuador around 1962, socioeconomic development was the main factor associated to mortality. This is indicated by the lower mortality of those provinces with higher socioeconomic development and, conversely, the higher mortality of those provinces with lower socioeconomic development. The role of public health policy implementation is significant but its direction is ambiguous as it appears positively related to general death and negatively related to infant mortality. The rather small number of cases used is probably one of the main reasons for the ambiguity of the findings.

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* Although multiple regression analysis performs functions somewhat similar to those of partial correlation, this method was used also because it gives the joint predictive power of both independent variables on the dependent one. In 1962, socioeconomic development and public health jointly explain about 11 percent ($r^2 = .108$) of the variation in general death and about seven percent ($r^2 = .073$) of the variation in infant mortality

Although public health does not appear highly related to mortality, it contributes to the latter's explanation. Therefore, it is of interest for the purposes of this study to find out which of the subvariables making up the public health index (living conditions and access to medical technology) is more important in accounting for mortality.

Table 31. Correlation Matrix, c. 1962 Data (2)

	Zero-Order Correlations		Partial Correlations	
	X_{2a} Living Conditions	X_{2b} Access to Medical Technology	X_{2a} (controlling by X_{2b})	X_{2b} (controlling by X_{2a})
Y_1 General Death	.00	.04	.04	.05
Y_2 Infant Mortality	.35	.04	.53	-.42

As observed in Table 31, all zero-order correlations are positive though most of them are extremely small. The highest coefficient ($r = .35$) corresponds to the relationship between living conditions (X_{2a}) and infant mortality (Y_1). About 13 percent ($r^2 = .125$) of the variation in infant mortality is attributable to variation in living conditions. Since the relationship is positive, it appears that the higher the living conditions, the higher the infant mortality; however, the coefficient is so low that it could practically be neglected. But because this finding is puzzling as it goes against most commonly held expectations, it is necessary to turn to the results provided by partial correlation. Partial correlation analysis shows a dramatic change in the relationship between the independent variable X_{2b} and the dependent variable Y_2. What in zero-order correlation was a low positive coefficient ($r = .04$), in partial correlation becomes a relatively high negative coefficient ($r = -.42$). It appears that 1) adjusting for the effects of access to medical technology, living conditions is positively related to infant mortality, and 2) adjusting for the effects of living conditions, access to medical technology is negatively related to infant mortality. While living conditions explains about 28 percent ($r^2 = .277$) of the variation in infant mortality, access to medical technology explains about 17 percent ($r^2 = .175$) of such variation.

In summary, the findings for circa 1962 differ according to the type of analysis used. Bivariate analysis, using zero-order correlation coefficients, gives results which contrast sharply with some of those provided by multivariate analysis techniques. The partial correlation findings indicate that the independent variables used explain only a small percentage of the variation in the dependent variables; socioeconomic development's relationship to mortality is greater than public health policy implementation's relationship to mortality. More specifically, socioeconomic development is negatively related to general death and positively related to infant mortality. Even though public health seems to be less important than socioeconomic development, it is a factor associated with mortality, particularly infant mortality. The only aspect of public health policy implementation related to mortality in accord with logical expectations is access to medical technology, controlling for living conditions.

Analysis of the data corresponding to about 1974 yields the following partial results:

Table 32. Correlation Matrix, c. 1974 Data (1)

	Zero-Order Correlations		Partial Correlations	
	X_1 Socioeconomic Development	X_2 Public Health	X_1 (controlling by X_2)	X_2 (controlling by X_1)
Y_1 General Death	-.29	-.32	-.02	-.13
Y_2 Infant Mortality	-.03	-.07	.07	-.09

As observed in Table 32, all zero-order correlation coefficients are negative, and very small. The relationships of the independent variables socioeconomic development (X_1) and public health (X_2) with general death (Y_1) are greater than their relationships with infant mortality (Y_2). Thus, at this point, it appears that both greater socioeconomic development and greater public health are slightly associated with lower general death and, even to a lesser extent, with lower infant mortality. However, some substantial differences appear when the results of partial correlation analysis are examined. All of the relationships practically disappear and only in one case -- between public health and general death controlling for socioeconomic development -- the independent variable explains more than one percent of the variation in the dependent variable (the r^2 for X_2 with Y_1 controlling by X_1 is .018).*

The data for about 1974 indicate that the main factors accounting for variations in both mortality variables are unknown; the variables, as constructed, are not the most relevant. Of the variables used, the greater association belongs to public health. In contrast to the case for about 1962, the present findings indicate that greater public health, rather than greater socioeconomic development, is related to lower general death and both greater public health and lower socioeconomic development are related to lower infant mortality.

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* Multiple regression analysis indicates that, in 1974, socioeconomic development does not contribute to the explanation of general death (its F-level or tolerance level was considered insufficient for computation purposes); in contrast, public health explains about ten percent (r^2 = .102) of the variation in general death. Furthermore, socioeconomic development and public health jointly explain not even one percent (r^2 = .008) of the variation in infant mortality.

It should be pointed out again that the relationships indicated by partial correlation are affected by the problem of multicollinearity: the correlation between the independent variables ($r = .89$) is very high; about 79 percent ($r^2 = .788$) of the variation in one variable is attributable to the other.

Once the significance of public health in its association to mortality in Ecuador by 1974 has been established, the role played by each of its subvariables can be ascertained. As observed in Table 33 below, most zero-order correlation coefficients are negative and small.

Table 33. Correlation Matrix, c. 1974 Data (2)

	Zero-Order Correlations		Partial Correlations	
	X_{2a} Living Conditions	X_{2b} Access to Medical Technology	X_{2a} (controlling by X_{2b})	X_{2b} (controlling by X_{2a})
Y_1 General Death	-.23	-.36	-.01	-.28
Y_2 Infant Mortality	.08	-.22	.28	-.35

The zero-order correlations indicate that each public health subvariable, living conditions (X_{2a}) and access to medical technology (X_{2b}) has a negative relationship with general death (Y_1). In contrast, living conditions has a positive but very low relationship with infant mortality (Y_2) while access to medical technology has a higher negative relationship with it. The use of partial correlation analysis provides a somewhat different picture of the relationships between the independent variables and mortality: 1) adjusting for the effects of access to medical technology, living conditions is negatively but only slightly related to general death and positively related to infant mortality; 2) adjusting for the effects of living conditions, access to medical technology is negatively related to both general death and infant mortality. While living conditions explains practically none of the variation in general death ($r^2 = .000$) and about eight percent ($r^2 = .079$) of the variation in infant mortality, access to medical technology explains about eight percent ($r^2 = .078$) of the variation of general death and 12 percent ($r^2 = .120$) of the variation in infant mortality.

Arriaga and Davis' theory of mortality decline for Latin America after 1930 is barely supported with 1974 data on Ecuador. Mortality variations are due to the effect of unexplained variables. In the present model, lower mortality is primarily associated to greater public health. The aspect of public health policy implementation more consistently and strongly related to mortality is access to medical technology. In contrast, living conditions is only slightly related to mortality.

To a certain point, Ecuador, in 1962 and 1974, seems to have replicated the conditions prevalent in Latin America as a whole before 1930 and after 1930, respectively. In about 1962 Ecuador, as in pre-1930

Latin America, lower mortality was mainly associated to higher socioeconomic development while, in 1974 Ecuador, as in post-1930 Latin America, lower mortality was mainly associated to higher public health care.

The statistical analysis performed so far has serious shortcomings. It has not contributed much to the knowledge of factors associated with mortality in 1962 and 1974 Ecuador. The social typologies had already indicated the apparent lack of correspondence between the provinces' mortality and their public health and socioeconomic conditions. The statistical findings indicate that the assumption of no relationship between the independent variables is erroneous. Public health policy implementation and socioeconomic development are highly related in the years 1962 and 1974; their mutual correlations are far greater than their individual correlations with the dependent variables.

Diachronic Analysis

Since this study stresses concepts denoting processes rather than structure or stationary conditions, -- mortality *decline*, socioeconomic *development*, public health policy *implementation* -- the analysis of diachronic or longitudinal data may be more adequate than the previous analysis of synchronic or cross-sectional data. Therefore, instead of dealing with conditions measured at fixed points in time, this section deals with the change occurring from the earlier to the later date. The measure of change for each variable was obtained by subtracting each 1974 value from its corresponding 1962 value. (The variables, their indicators, and the mode of index construction were described at the beginning of this chapter.)

Social change typology of the provinces

During the 1962 to 1974 period, practically all of the Ecuadorian provinces experienced relatively more favorable social change. As observed in the final typology of Table 34, most of them occupy the more favorable upper five types; only one province is located within the less favorable lower five types. The most favorable change in overall social conditions occurred in Galápagos and Chimborazo, both of which occupy rank nine of type II. In contrast, the least favorable change occurred in Zamora Chinchipe, which is at the bottom in rank ten of type VII. Establishing a dichotomy between the more favorable upper five types and the less favorable lower five types in each of the subtypologies, it can be seen that the majority of provinces are located in the upper five types across the table. The majority of Ecuador's provinces experienced the most favorable change in general death, followed in descending order by favorable change in infant mortality, public health, and socioeconomic development.

The fact that at least 12 provinces are located in the more favorable upper five types of each subtypology is indication of some correspondence between changes in one phenomenon and changes in another, and, particularly, between changes in mortality and changes in either public health or socioeconomic development. Yet, some apparent contradictions persist. For example, Galápagos, during the 1962 to 1974 period, experienced the most favorable change in public health and in infant mortality (the highest decline) but, in contrast, it experienced the least favorable change (the lowest decline) in general death. This case, however, cannot be used for generalizations because, as pointed out in previous occasions, Galápagos is an atypical province for it has an extremely small population.

A much more important fact observed in the social change typology

Table 34. Social Change Typology of the Provinces of Ecuador, 1962 to 1974

Type	Final Typology			Subtypology I General Death			Subtypology II Infant Mortality			Subtypology III Public Health			Subtypology IV Socioec. Devel.		
	Rank	Province	Indic.	Rank	Province	Indic.	Rank	Province	Indic.	Rank	Province	Indic.	Rank	Province	Indic.
I.				1	Tungurahua	110.0	1	Galápagos	110.0	1	Galápagos	108.7			
				2	Carchi	107.4									
				3	Los Rios	104.8									
				4	Chimborazo	102.6									
II.	9	Galápagos	71.7	1	Imbabura	86.5	1	Los Rios	86.5						
	9	Chimborazo	70.1	2	Manabí	84.5	2	Tungurahua	84.5						
				3	Cotopaxi	82.5	3	Imbabura	82.5						
				3	Pichincha	82.5	4	Cañar	80.5						
				4	Guayas	80.5	5	Pichincha	78.6						
				4	Morona S.	80.5	6	Chimborazo	76.8						
				5	Cañar	78.6									
III.	2	Imbabura	65.4	1	Pastaza	68.1	1	Cotopaxi	68.1	6	Chimborazo	58.6	5	El Oro	60.7
	4	Los Rios	63.2	2	Azuay	66.5	2	Manabí	66.5				5	Napo	60.6
	4	Tungurahua	62.6				3	Azuay	64.9				6	Morona S.	59.4
	5	Carchi	61.4				4	Carchi	63.4				7	Azuay	58.8
	5	Manabí	61.0				5	El Oro	61.9				9	Galápagos	55.6
	6	Morona S.	60.1				6	Guayas	60.4				10	Esmeraldas	53.9
	7	Pichincha	57.6				7	Morona S.	58.7						
	7	Azuay	57.6				8	Bolívar	57.6						
	10	Cañar	55.3												
IV.	1	El Oro	52.3	1	Loja	53.6	1	Loja	53.6	1	Imbabura	53.4	5	Manabí	46.1
	6	Pastaza	46.7				2	Pastaza	52.3	5	Esmeraldas	48.1	10	Chimborazo	42.3
	6	Guayas	46.6							6	Carchi	46.6			
	7	Cotopaxi	46.0							8	Manabí	44.8			
	9	Loja	44.0							10	El Oro	43.0			
										10	Napo	42.4			
V.	6	Esmeraldas	36.7	1	El Oro	42.1				2	Morona S.	40.2	3	Imbabura	39.3
	6	Bolívar	36.2							4	Pastaza	39.3	5	Los Rios	39.0
	10	Napo	33.9							4	Azuay	39.1	8	Loja	35.0
										5	Zamora Ch.	37.9	9	Pichincha	34.6
										8	Pichincha	35.3			
										8	Tungurahua	35.1			
										10	Los Rios	33.9			
VI.				1	Bolívar	33.2				5	Cañar	29.5	1	Cañar	32.4
				2	Esmeraldas	32.4							2	Guayas	32.3
													3	Bolívar	31.1
													8	Pastaza	27.2
													9	Carchi	26.9
VII.	10	Zamora Ch.	21.0							7	Los Rios	22.6	10	Tungurahua	20.7
										8	Bolívar	21.6	10	Zamora Ch.	20.7
VIII.				1	Napo	20.5				7	Cotopaxi	17.4			
IX.													1	Cotopaxi	16.1
X.				1	Zamora Ch.	12.7	1	Zamora Ch.	12.7	4	Guayas	11.7			
				2	Galápagos	12.4	2	Esmeraldas	12.4						
							3	Napo	12.1						

of Table 34 is that Pichincha and Guayas -- the provinces which in 1962 and 1974 (see Tables 28 and 29) ranked high in terms of public health policy implementation and socioeconomic development -- did not experience the most favorable social change in the 1962 to 1974 period. They classified in the more favorable upper five types of typologies III and IV but in relatively low positions. This is significant because it indicates a clear trend towards redressing the imbalance between the social conditions existing in Pichincha and Guayas and those existing in the rest of the country. Thus, the period under consideration was characterized by substantial changes in public health policy implementation and socioeconomic development in many provinces: their changes were often greater than those corresponding to Pichincha and Guayas.

Statistical analysis

Analysis of the change occurring from about 1962 to 1974 gives the following results:

Table 35. Correlation Matrix, Data on 1962-74 Change (1)

	Zero-Order Correlations		Partial Correlations	
	X_1 Socioeconomic Development	X_2 Public Health	X_1 (controlling by X_2)	X_2 (controlling by X_1)
Y_1 General Death	-.34	-.33	-.22	-.21
Y_2 Infant Mortality	-.08	.27	-.24	.35

The zero-order correlation coefficients of Table 35 are quite modest; they indicate that the independent variables, socioeconomic development (X_1) and public health (X_2), are negatively related to general death decline (Y_1). The relationship of economic development with infant mortality decline (Y_2) is also negative but insignificant, and, in contrast, the relationship of public health with infant mortality decline, though also low is positive. At this point, it appears that greater general death decline is associated with lower socioeconomic development and lower public health, but, in contrast, greater infant mortality decline is associated only with greater public health.

After introducing controls (see partial correlation coefficients in Table 35), it is found that 1) adjusting for the effects of public health, socioeconomic development is still negatively related to both general death decline and infant mortality decline, and 2) adjusting for the effects of socioeconomic development, public health is negatively related to general death decline but positively related to infant mortality decline. Socioeconomic development and public health individually explain less than five percent ($r^2 = .048$ and $.044$ respectively) of the variation in general death decline and about six ($r^2 = .058$) and 12 percent ($r^2 = .122$) of the variation in infant mortality decline.*

In contrast to what occurs in the statistical analysis of synchronic data, the relationship between the independent variables representing 1962 and 1974 change is relatively low. The correlations between public health and socioeconomic development is .46, indicating that about 21 percent ($r^2 = .212$) of the variation in one variable is attributable to the other. Notwithstanding this low correlation, the problem of multicollinearity persists in the model because the independent variables are more related to each other than individually to the dependent variables.

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* Multiple regression analysis indicates that, between 1962 and 1974, socioeconomic development and public health jointly explain about 11 percent ($R^2 = .115$) of the variation in general death and about 13 percent ($R^2 = .127$) of the variation in infant mortality.

Summing up, the analysis of data on the process of change occurring in the provinces of Ecuador from about 1962 to 1974 indicates the contradictory role of public health: on the one hand, it is negatively related to general death decline and, on the other, it is positively related to infant mortality decline.

In order to achieve further insight regarding the determinants of mortality change, public health has again been subdivided into two variables, living conditions and access to medical technology. Their particular correlations with the mortality variables are shown in Table 36.

Table 36. Correlation Matrix, Data on 1962-74 Change (2)

	Zero-Order Correlations		Partial Correlations	
	X_{2a} Living Conditions	X_{2b} Access to Medical Technology	X_{2a} (controlling by X_{2b})	X_{2b} (controlling by X_{2a})
Y_1 General Death (Decline)	-.06	-.51	.14	-.52
Y_2 Infant Mortality (Decline)	.16	.30	.06	.27

The zero-order correlation coefficients in Table 36 indicate that changes (i.e., improvements since greater values represent more favorable changes) in both public health subvariables (X_{2a} and X_{2b}) are negatively but barely related to general death decline (Y_1) but positively related to infant mortality decline (Y_2). But the relationship between access to medical technology and the two mortality decline variables is greater than the corresponding relationship of living conditions. Some interesting changes appear with the introduction of controls: 1) adjusting for the effects of access to medical technology, living conditions is positively but barely related to general death decline as well as to infant mortality decline;

2) adjusting for the effect of living conditions, access to medical technology is negatively and relatively highly related to general death decline but positively related to infant mortality decline. While improving living conditions explains about two percent ($r^2 = .019$) of the variation in general death decline and less than one percent ($r^2 = .004$) of the variation in infant mortality decline, increased access to medical technology explains 27 percent ($r^2 = .27$) of the variation in general death decline and about seven percent ($r^2 = .072$) of the variation in infant mortality decline.

In opposition to Arriaga and Davis' theory of post 1930 mortality decline in Latin America, the mortality decline of the population of Ecuador's provinces during the 1962 to 1974 period is mostly unexplained; it appears only slightly associated with lower socioeconomic development. Public health's role in mortality decline apparently varies depending on whether the mortality change variable considered is general death decline or infant mortality decline. Greater public health is associated with the lower decline of general death in the provinces of Ecuador, however, greater public health is associated with the greater decline in infant mortality. While general death declined less with improvements in socioeconomic conditions and in public health policy implementation, infant mortality declined less with socioeconomic improvements, and more with greater public health policy implementation.

CHAPTER VII
CONCLUSIONS

In order to avoid repeating comments already included at the end of chapters II to V, the present chapter explores the ramifications of the study of the factors related to mortality decline in Ecuador. It points out the most obvious shortcomings of the model used in chapter VI and analyzes the best predictors of mortality, aiming at the improvement of similar types of endeavors. Finally, it outlines briefly some of the theoretical and practical implications of the present work's findings.

Shortcomings of the Model Used for the Present Study

No definitive statements can be made in this study regarding the relationships between the independent variables, on one hand, and the dependent variables, on the other. First, most of the correlation coefficients obtained are below 50, generally between 20 and 30, which means that the independent variables seldom explain over ten percent of the variations in the dependent ones. Second, the direction of several relationships is in opposition to certain established facts. The decline of mortality in the nation as a whole and in the majority of provinces has been documented for the 1962 to 1974 period; similarly, most of the data on socio-economic development and public health indicate that conditions improved from 1962 to 1974; yet the results of the statistical analysis in some cases cannot be interpreted unless one is willing to assume either that no improvement occurred in public health or that there was no real socio-economic progress during the period studied.

The low degree of significance and ambiguity of the statistical analysis' results are probably related to one or more of the following problems: 1) The number of cases is very small -- the province is the unit of analysis and there are only 20 provinces in Ecuador -- therefore, great distortions in the final results can occur due to the influence of a case with atypical characteristics (i.e., the case of Galápagos, whose scores on several variables are extremely abnormal). 2) Some assumptions made in the model do not hold against the facts; for instance, it is assumed that the independent variables are unrelated, yet the data indicate their mutual relationship is often greater than their separate relationship with the dependent variables. 3) The indicators used to construct the independent variables are either inadequate or the indexes should be constructed combining indicators in a different way.

The Best Predictors of Mortality in Ecuador

The problem of what indicators, among the available data, are the most appropriate for the study of the determinants of mortality decline is analyzed for the implication it may have on further research. This section tries to find the best predictors of both general death and infant mortality, using first the synchronic data for 1962 and 1974 (Tables 22 and 23) and, second, the diachronic data for the 1962 to 1974 period (Table 27).

A multiple regression program was utilized in order to obtain the best predictors of mortality. The multiple regression model gives a measure of the average change in the dependent variable (Y) when one of the independent variables (X) is increased by one unit and all other independent variables are kept constant. Regression analysis serves to indicate the power of prediction of the independent variables. The dependent variables are the same as before, general death, Y_1, and infant mortality,

Y_2. The independent variables are what previously were referred to as indicators, whose values were used for index construction (see description of indicators in page 132 and 133 of the previous chapter); they are water (z_1), sewage (z_2), hospital beds (z_3), doctors (z_4), urbanization (z_5), illiteracy (z_6), and agrarianism (z_7). The variables used in the synchronic analysis are measured by the raw values of the indicators; in contrast, the variables used in the diachronic analysis are measured by the standardized values of the indicators of change; these change values were obtained by subtracting the 1974 values of each indicator from their corresponding 1962 values; since in each variable, high scores mean more favorable change (mortality decline, less illiteracy, more doctors, etc.), it is necessary to redefine the variables to denote positive change; thus, the variables in the diachronic analysis are: general death decline (Y_1), infant mortality decline (Y_2), provision of water (z_1), provision of sewage (z_2), increasing number of hospital beds (z_3), increasing number of doctors (z_4), urbanization (z_5), increasing literacy (z_6), and decreasing agrarianism (z_7).

The regression equations obtained using cross-sectional data on Ecuador's provinces for circa 1962 are the following:

$$1)\quad Y_1 = .43 - .27z_1 - .19z_2 - .24z_6$$

The best predictors of general death (Y_1) in 1962, are water (z_1), sewage (z_2), and illiteracy (z_6). The R^2s or multiple correlation coefficients indicate that water alone explains five percent of the variation in general death; water and sewage explain 30 percent, and all three variables explain about 46 percent. But analyzing the zero-order correlations among these three variables it is found that water is highly correlated with sewage ($r = .75$) and with illiteracy ($r = -.67$), while illiteracy and sewage have a lower correlation ($r = -.54$). Therefore, it seems advisable to use only the least correlated pair (illiteracy and sewage) as the best predictors of general death in 1962, thus avoiding at least in part, the problem of multicollinearity.

2) $Y_2 = -.3.23 - 1.95z_1 - 1.74z6 - 11.71z_4$

The best predictors of infant mortality (Y_2) in 1962 are water (z_1), illiteracy ($z6$), and doctors (z_4). Water alone explains 18 percent of the variation in infant mortality, water and illiteracy explain 33 percent, and all three variables explain about 47 percent. This time, among the three best predictors of infant mortality are two variables (water and doctors) previously used as part of the public health index and one variable denoting socioeconomic development. Yet, as pointed out in the previous paragraph, water and illiteracy are highly correlated. The zero-order correlation between water and doctors is similarly high ($r = .60$), but the correlation between illiteracy and doctors is very low ($r = -.21$). Therefore, the problem of multicollinearity in the regression model can be largely avoided using only illiteracy and doctors as the best prediction of infant mortality in 1962.

In other words, controlling for the effects of other independent variables (partial regression) in Ecuador's provinces, the less the illiteracy in 1962, the less the mortality (both general death and infant mortality); the greater the availability of sewage in 1962, the less the general death; and the greater the availability of doctors per population, the less the infant mortality.

The regression equations obtained using data for circa 1974 are the following:

1) $Y_1 = 4.77 - .18z_6 - .25z_1 - .24z_2$

The best predictors of general death (Y_1) in 1974 are illiteracy (z_6), water (z_1) and sewage (z_2). Illiteracy explains 19 percent of the variation in general death; illiteracy and water explain 28 percent, and all three independent variables explain about 54 percent. Although their relative power of prediction varies from one date to another, the same variables are the three best predictors of general death in 1962 and 1974.

2) $Y_2 = 28.79 - 1.40z_1 - 1.09z_6 - .91z_2$

The best predictors of infant mortality (Y_2) in 1974 are water (z_1), illiteracy (z_6), and sewage (z_2). Water explains 11 percent of the variation in infant mortality; water and illiteracy explain 32 percent, and all three variables explain about 42 percent. Since sewage is highly correlated with water ($r = .87$) and with illiteracy ($r = -.55$), while water and illiteracy have a lower correlation ($r = -.49$), it seems convenient to use only water and illiteracy as the best predictors of general death and of infant mortality in 1974.

In the regression equations for 1974 synchronic data, water and illiteracy are two of the three best predictors of mortality. Their signs. however, are positive. This indicates that a separate unit increase in each variable, controlling for the effects of other independent variables, will be accompanied by corresponding increases in the dependent variable, and *vice versa*.

Thus, controlling for the effects of other independent variables in each case, in Ecuador's provinces, the less the availability of water in 1974, the less the mortality (both general death and infant mortality); the less the illiteracy (i.e., greater literacy) in 1974, the less the mortality (again, both general death and infant mortality). The first relationship does not agree with normal expectations that tend to associate lower mortality with greater, rather than lower, availability of potable water; in contrast, the second relationship falls in line with previous experience around the world, in which lower mortality is indeed associated to greater literacy.

The regression equations for the changes occurring in the provinces of Ecuador from 1962 to 1974 are the following:

1) $Y_1 = 104.35 - 2.01z_3 - .50z_7 - .22z_2$

The best predictors of general death decline (Y_1) during the 1962 to 1974 period are the provision of hospital beds (z_3), decreasing agrarianism (z_7), and the provision of sewage (z_2). The provision of hospital beds explains 41 percent of the variation in general death decline; provision of hospital beds and decreasing agrarianism explain 50 percent, and all three variables explain 53 percent. The relatively high correlation between the independent variables provision of hospital beds and decreasing agrarianism ($r = .57$), which surpasses that of provision of hospital beds and provision of sewage ($r = .33$) indicates that problems of multicollinearity can be reduced by dropping decreasing agrarianism from the list of best predictors of general death decline in 1974.

2) $Y_2 = 88.38 - 1.83z_3 - .22z_7 - .47z_4$

The best predictors of infant mortality decline (Y_2) are the provision of hospital beds (z_3), decreasing agrarianism (z_7), and increasing number of doctors per population (z_4). The provision of hospital beds explains 55 percent of the variation in infant mortality decline; provision of hospital beds and decreasing agrarianism explain 58 percent, and all three change variables explain about 60 percent. However, increasing number of doctors per population has high correlations with provision of hospital beds ($r = .87$) and with decreasing agrarianism ($r = .64$), and the latter two variables have also a relatively high correlation ($r = .57$). This represents a serious problem of multicollinearity. The solution to the problem would be either to work with only one variable or to use them to construct an index which could be called development or modernization.

Regression analysis using diachronic or longitudinal data thus indicates that two public health related variables (provision of hospital beds and provision of sewage services) along with a development related variable (decreasing agrarianism) play an important role in the explanation of mortality decline in Ecuador from 1962 to 1974. Looking at the signs of the two regression equations, which indicate the direction of each relationship between dependent and independent variables, several associations can be mentioned. Controlling for the effects of other independent variables in each equation, in Ecuador's provinces, the greater the provision of hospital beds during the 1962 to 1974 period, the less the decline in mortality. (Thus mortality decline does not necessarily accelerate in association with greater provision of hospital beds.) Similarly, the greater the decrease in agrarianism during the 1962 to 1974 period, the less the decline in mortality. But, in contrast, the greater the provision of sewage services during the 1962 to 1974 period, the greater the decline in mortality.

Theoretical and Practical Implications

One of the most significative findings of the synchronic analysis is that, in Ecuador's provinces, in 1962 and in 1974, lower mortality is primarily and consistently explained by the greater literacy of their populations. Regardless of other factors, some basic education seems to be necessary for maintaining relatively higher levels of health. Perhaps literate populations have higher standards of living and better hygienic and dietary habits than their illiterate counterparts. They may have not only a better knowledge of the availability of public health care services but also a certain basic trust in the latter's ability to combat disease. More importantly, they are probably more inclined to use whatever public health services that are available, even if it requires making long trips and using some of their scarce resources. At the same time, the opposite may hold true for illiterate populations. They may not only lack some essential hygienic and dietary habits but also ignore both the availability of public health care services and the benefit the latter can provide in terms of preventing and curing illnesses. Their lack of education may also be associated with distrust of modern medical techniques and with the perpetuation of their traditional commitment to folk medicine which, if certainly helpful, does not match the efficiency of modern medical technology.

Diachronic analysis, on the other hand, shows that, in Ecuador's provinces, between 1962 and 1974, greater mortality decline is primarily explained by the provision of sewage services to their populations. The study of mortality conditions in Ecuador (see chapter V) already pointed out that infectious and parasitic diseases were among the principal causes of death in the country. Thus, it is not surprising that mortality would show a marked reduction with the increment of sewage systems. Their purpose is precisely to clean the human environment and to control the spread of disease by eliminating human and industrial refuse in a sanitary way. But, diachronic analysis also shows that, during the 1962 to 1974 period, more hospital beds per population and greater decrease in agrarianism (i.e., greater transfer of labor out of the agricultural sector) are associated with a slower, rather than faster, decline in mortality. It is paradoxical that the creation of clinics and hospitals would be related to lower mortality decline. In chapter IV, the explanation of this relationship has already been suggested in the context of the analysis of the differential distribution of the health resources available in the nation. With regard to the distribution of hospital beds in Ecuador's provinces, two explanations are suggested: 1) Mortality declines slowly despite the greater number of hospital beds per population probably due to public health resources being diverted from other more essential health activities, such as the provision of sewage. 2) The population at large does not have real access to the hospitals and clinics existing in each province. As pointed out previously, these institutions serve mainly upper and middle class urban minority groups. People belonging to these groups are able to afford the cost of specialized medical attention and of medicines; and, more often than not, they are "entitled" to the health care services available because of membership in institutions such as the Armed Forces and the Social Security. In contrast, the majority of the population made up of rural inhabitants and lower class urban majorities rely primarily on their folk medicine and have little contact with hospitals and clinics. The beds they use when sick are those of the dwellings in which they reside.

It is similarly puzzling that the transfer of labor force from agriculture to other economic activities would be related to lower mortality decline, since it is generally believed that this phenomenon is usually related to processes of industrialization and economic development. Thus, in a way, it would seem that increasing economic development is related not to faster but to lower decline in mortality. What has become apparent from the previous analysis as well as from the results obtained in the preceding chapter is that the relationship between socioeconomic development and mortality decline is not as clear cut as theories would lead one to expect. Ecuador seems to be at a stage of its socioeconomic development which brings about a reduction in mortality at the aggregate level and, at the same time, slower decreases and even increases in mortality among some sectors of its population. This phenomenon is not without precedents. In Europe, socioeconomic development was followed by an overall mortality decline but one of the first consequences of the Industrial Revolution was an increase in mortality among the working class. This phenomenon was attributed mainly to the infamous conditions in which men, women, and children had to work for long hours every day. Notwithstanding the fact that the European experience is hardly comparable to Ecuador's -- given that the incipient industrialization and socioeconomic development in general are taking place in a radically different world context and in conditions where there already exist some protective national legislation for workers -- some of the conditions found in Ecuador resemble those that were characteristic of Europe at a previous time.

Besides the effects that industrialization may have on the health levels of the population, the case of Ecuador should be seen in the proper perspective. Ecuador's development is dependent on the international economic situation, where a few large countries dominate many smaller ones. At the same time, the country is characterized by internal relationships of domination and exploitation, previously referred to as internal colonialism. Dependent development has been accompanied by increasing polarization and inequality. In Ecuador, there exists a small privileged class that has a virtual monopoly of economic and political power and enjoys standards of living comparable to those of any developed country. At the same time, there also exists an increasingly large majority of people practically devoid of economic and political power, whose standards of living are among the lowest in the world.

With specific reference to the displacement of the labor force from agriculture to other activities and its relation to lower mortality decline, the following explanations are suggested: 1) Ecuador's incipient industrialization is able to absorb only a small percentage of the labor force previously dedicated to agricultural activities, i.e., industrialization is not labor intensive. Thus, former agricultural workers end up either unemployed or holding menial jobs in the cities. Their mortality increase is not due so much to working conditions but rather to their inability to make a living and to provide for the sustenance of their families. 2) Along with incipient industrialization in Ecuador there has been a trend towards reduced agricultural production because of (a) the general public neglect of the agricultural sector and (b) the increasing use of available land either for the production of export crops (cocoa, bananas, coffee) or for pastures. The result of these practices is that more foodstuffs for the middle and upper class consumers are produced, namely meat and dairy products, while there are less of the poor people's staples, such as beans, corn, wheat, and barley. Decreasing agricultural production naturally leads to scarcity of food items and higher prices. This in turn represents lower consumption patterns for the lower classes and therefore greater malnutrition and susceptibility to illness. 3) Finally, incipient industrialization tends to be associated with rapid urbanization. Uncontrolled urbanization, especially if it occurs without a corresponding increase in the provision of housing and the whole complex of public services (water, sewage, health, education, etc.) can also create living conditions where there is a decrease in the levels of health of the population and a corresponding increase in mortality. Thus, mortality tends to increase in situations of slum living, where there is crowding, uncleanliness, in general, widespread poverty. Another factor worth noting in the case of Ecuador is that, as people abandon farm work and migrate to the cities, they tend to rely more and more on unprocessed food sold in neighborhood stores and processed food sold in the streets, both of which are commonly kept and sold in very anti-hygienic conditions.

The data analyzed in the present chapter tend to support the theory that public health policy is associated with mortality decline in Ecuador. This is particularly evident in the diachronic study. From 1962 to 1974 when (as shown in the preceding chapters) the level of activity in the public health sector increased dramatically as compared to previous years, with an improvement evident in both public health planning and implementation -- i.e., when there was not only a Ministry of Public Health but also other strong public health institutions; when national health plans were formulated and there were higher absolute and relative budget allocations to public health as well as more preventive and curative services around the nation -- then mortality decline was associated primarily with public health factors, particularly with the provision of sewage and, to a lesser extent, with the provision of hospital beds. But mere availability of health services is a variable less important than the actual distribution and access to them. The predictive value of literacy buttresses this conclusion. The actual access to medical technology is a function of education as well as of the infrastructure of economic development such as roads and increased mobility through motorized vehicles, increased mass communications, etc. It is also a function of the social distances and class structure of the nation and of the prevailing economic, political and cultural conditions. Public health policy implementation in countries which, like Ecuador, are characterized by a structure of privileges and sharp social inequalities needs to establish means of aggressively making public services like potable water, sewage systems, and health care, actually accessible to the most deprived segments of their populations. For instance, this can be achieved by providing potable water and sewage systems to small towns which do not have these services, by extending health care services of institutions like the Social Security to people in all occupations, particularly to groups such as rural agricultural workers and their families, domestic servants, street vendors, and construction workers. Similarly, greater coverage can be provided by sending mobile medical units to the rural areas and to slum areas in the cities, together with adequate equipment and medicines and creating permanent health centers in those same areas so that there is continuity in the health care provided.

In order to achieve further reductions of mortality in general, public health policy must continue to improve in both its programming and implementation aspects. Public health should become a higher priority of the central government than it actually is, so that, as a consequence, a greater proportion of national resources are dedicated to increasing the quantity and quality of public health services. Apparently, the acceleration of mortality decline goes hand in hand with the provision of sewage services and the increase of number of hospital beds per population in the provinces of Ecuador. Since both variables are components of what this study defined as public health policy implementation, it can be concluded that the experience of Ecuador during the 1962 to 1974 period tends to support Arriaga and Davis' theory of mortality change in post-1930 Latin America. The main factor associated with mortality decline in Ecuador is improving public health care.

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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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